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Coal and Electricity

Allies or Enemies?

HAS the greatly increased output of electricity during the past few years injured or benefited the coal industry? After a considerable lull there has recently been a recrudescence of complaints from coalowners and their representatives regarding the adverse effect of electricity upon their business. For instance, at the recent I.E.E. dinner the Earl of Dudley said that the rise in the cost of coal had been due to some extent to the loss of domestic coal sales brought about by the extension of domestic uses of electricity.

At first glance such statements as this would suggest that electricity was produced so efficiently that raw coal was quite unable to compete with it. Or, conversely, that raw coal was applied in an extremely inefficient manner. The highest thermal efficiency yet attained by a British power station is 27.7 per cent. and the losses in distribution (say 11 or 12 per cent.) have to be reckoned, so that although at the point of application a very high efficiency is reached, it would seem that the more electricity is used the better it is for the coal industry. Otherwise there would appear to be a sad waste when raw coal is used directly.

Varying Prices

The flaw in this argument, of course, is that domestic coal selling at 50s. or 60s. a ton is supplanted by electricity produced by the use of a low grade of fuel for which electricity undertakings pay from 15s. to 20s. a ton. Thus electricity can apparently compete on level terms if its efficiency in use is only about a third of that of domestic coal whereas, in point of fact, the efficiencies are about equal. This confirms the inference that the inefficiency of raw coal, apart from its lack of "flexibility" and soot-producing propensities, makes it entirely undesirable for domestic use.

It has to be said that the price paid by the domestic consumer is not that received by the coalowner who gets between 40 and 50 per cent. usually, whereas he receives a much greater proportion of the power station price.

When we turn to railway traction it looks on the face of things as though electrification, even if considered only from the fuel point of view, pays handsomely. Nevertheless in a recent speech, the chairman of the London and North Eastern Railway, referring to the railways' relations with the coal industry, said that "the railways have resisted the blandishments of oil and electricity and the overwhelming majority of our trains to-day are steam hauled."

The efficiency of a steam locomotive is extremely low (it never reaches 10 per cent.) and a good grade of coal is required. It is impossible to ascertain what the railway companies pay for this coal but on the open market it would probably fetch from 30s. to 40s. a ton. Consequently the position seems much the same as in the domestic sphere and that "inefficiently" produced electricity is able to stand its ground in competition with steam so far as efficiency of use in concerned.

Co-operation at Manchester

We have recently discussed the question of urban street transport in urging that Manchester should adopt trolley-buses rather than oil-engined vehicles in the place of its trams. In this matter the electrical industry actually had the support of the coal industry, the reason being that trolley-buses are fundamentally users of coal-produced energy (equivalent to 50 tons of coal per vehicle per annum) while oil buses rely on imported fuel.

The coal industry's attitude to the industrial use of electricity should be "conditioned" by similar considerations. The alternatives to steam plant in a factory are internal combustion engines or electricity. The former may possibly be gas-operated (and therefore indirectly consumers of coal) but the odds are that they will use oil fuel. Consequently the policy of the coal industry should be to encourage industrial electrification in cases where a change-over from steam plant is contemplated to ensure that one kind of coal-produced energy is replaced by another.

The coal industry, moreover, should not tell electricity suppliers that they have brought coal-price increases on themselves. It should be remembered that if these increases are reflected in the cost of the kilowatt-hour and retard electrical development the coal industry will be one of the principal sufferers.

In his recent I.E.E. paper on "Electricity in Coal Mines" Mr. R. Nelson called for co-operation between the two industries which had so much in common. What is needed is a clear statement from the coal industry as to its attitude towards the electricity supply industry and an indication of its future policy.

An Appeal to Reason

DEALING with export trade last week we said that political handicaps to foreign trade could be met by retaliation or by agreement. These two alternatives were prominent in the speech of the President of the Board of Trade at the Mansion House last Monday. Mr. Stanley reminded his audience that we were the largest purchasing nation in the world and were entitled to expect our suppliers to buy from us. Unfortunately there were too many one-way streets in our international commercial traffic. He defended our adoption of tariffs in a protectionist world and pointed out that they were protective not prohibitive. State-aided cut-throat competition could only eventually impoverish the supplier and be of no ultimate advantage to the consumer. Mr. Stanley considered that by discussion between nations such competition could be avoided. He instanced the Anglo-American trade agreement as an example of the possibilities and referred to the forthcoming discussions between British and German industrialists. We hope with Mr. Stanley that these discussions will have fruitful results.

E.D.A.'s Invitation

THE decision of the British Electrical Development Association to hold its annual luncheon on March 17th at Grosvenor House, instead of at the Savoy Hotel as usual, means that there will be more room for the guests who are expected to come along in greater numbers than ever. The toast list is a brief one, consisting merely of the loyal toast and one other, which will be proposed by the Duke of Kent and responded to by Lord Lytton, the President of E.D.A. The Association is anxious to make it as widely known as possible that all members of the industry are welcome at the lunch. Tickets cost 16sd. 6d. each, including wines, etc.

A Bad Case

SOME curious comments on railway electrification were made by Lord Monkswell in the House of Lords last week. He accused the Southern Railway of hushing up the financial details of its electrification work although all the world knows that electrification has proved to be the salvation of that system. He further said that electrically-operated stock caused " acute discomfort " to passengers. It is not denied that some of the ancient converted stock used by the Southern was not the acme of comfort but that had nothing to do with electrification. The modern Southern Electric trains are as comfortable as any steam stock. Lord Erne and Lord Balfour of Burleigh had no difficulty in justifying electrification. There may be arguments against it but they are not those put forward by the noble lord.

Labelling Switches

OF the twenty-seven accidents commented on in the current issue of the quarterly publication of the Home Office entitled " How Factory Accidents Happen " (Stationery Office, 3d. net), only one has any electrical bearing, but it relates to a common defect in workshop organisation. The jamming of a conveyor in a biscuit factory necessitated the removal of the fencing of some chain-and-sprocket gearing. While the conveyor was being cleared, the motor was started in error by another person and the hands of the maintenance man were crushed in the gears. The switch controlling this motor was mistaken for another controlling a bucket conveyor which it was intended to run up. Such a risk could have been guarded against by withdrawing the fuses or locking out the isolators controlling the machine under maintenance or at least by hanging a warning notice on the switch handle. Where there is any possibility of confusion, however, switches for different machines should be distinctly labelled as an additional precaution.

A Furnace Question

WITH the fast-increasing tendency to-day to produce all manner of goods from steel stampings, because of the low production costs permitted by the greater workability of high-quality steels, comes the call reciprocally for higher and yet higher grade steels, and with these demands the electric furnace is becoming increasingly important to the steel manufacturer. It was at first thought that the high-frequency furnace would be developed at the expense of the electrode furnace, but obviously this is not the case. A good deal of misunderstanding exists among electrical and steel men as to the line of demarcation between the arc and the high-frequency furnaces, and although metallurgically the difference between them is considerable and complex, the broader position at the moment is fairly simple. Both kinds of furnace are being used for the production of alloy steels generally. They are often complementary and may be seen in various steelworks working side by side. The h.f. furnace is operated with charges entirely of scrap with the correct analysis so far as sulphur and phosphorus are concerned, so that little or no refining is necessary, whereas the arc furnace is used where refining is necessary, and consequently merchant metal is used in the charge. It should not be thought from this that refining is not possible with the h.f. furnace; in this case it requires much greater skill, particularly in connection with the refractory lining.

Tariffs for Trolley-buses

SPEAKING at the B.I.F. official luncheon on Tuesday, the Minister of Transport supplemented his earlier pronouncement (upon which we commented last week) that trolley-buses should be installed where tramways are displaced, if only because they entail the burning of home-produced coal. It is equally important, he emphasised, that electricity should be supplied for the trolley-buses at a fair price. As to what is a fair price there may be room for some divergencies of view but certainly not of the magnitude indicated by the vast differences that exist between the rates charged for tramways often in quite comparable circumstances. Matters have doubtless improved somewhat since Mr. C. Furness, in reviewing traction tariffs at the Municipal Transport Conference in 1932, revealed a state of affairs that transport managers quite understandably regarded as fantastic. Energy costs may not be a large proportion of total operating costs, but they may be enough under conditions favourable to oil-engined buses to turn the scale in favour of the latter, economically speaking. It is now many years since high charges to the transport department could be imposed to bolster up a struggling electricity undertaking, but the outlook apparently persists. Whether or no the " undue preference " provisions of the Supply Acts could be successfully invoked to secure reasonable charges for trolley-bus operation, there seems no sound reason why the charges should be higher than to industrial consumers with similar load factors.

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The British Industries Fair

Functions in London and Birmingham

Brilliant weather favoured the opening of the Fair on Monday last and created a spirit of optimism among the exhibitors. It was noteworthy that there was an improvement in the amenities at Castle Bromwich, regarding which we had something to say last year. The President of the Board of Trade made a straightforward speech at the Mansion House on Monday, in which he warned our competitors that export trade was vital to this country and we could not countenance the continuance and intensification of unfair methods

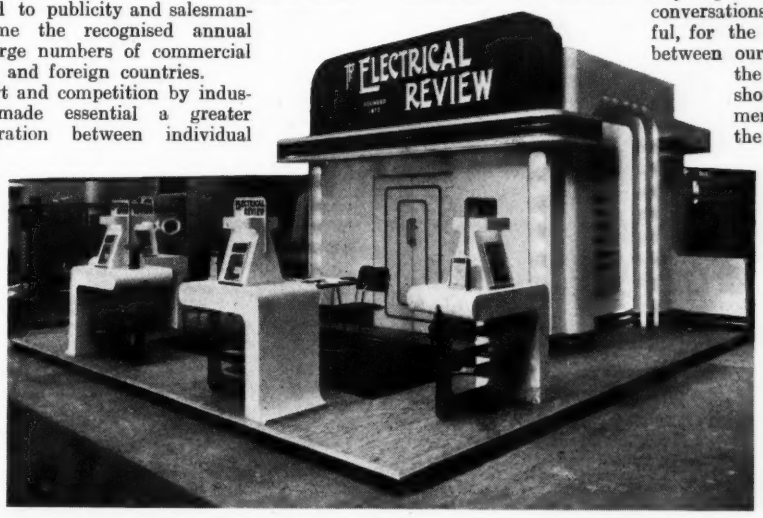
The Mansion House Dinner

AS usual there was a very distinguished and representative gathering at the Mansion House upon the occasion of the Government's dinner last Monday evening marking the opening of the Fair. H.R.H. The Duke of Gloucester, K.G., was the principal guest, and after the loyal toasts proposed "British Industry and the British Industries Fair." In the course of his speech His Royal Highness referred to the personal interest taken in the Fair by the Royal Family since its inception.

The Fair was a practical illustration of the increased attention now being paid to publicity and salesmanship. It had become the recognised annual meeting place for large numbers of commercial visitors from British and foreign countries.

The organised effort and competition by industries abroad had made essential a greater measure of co-operation between individual manufacturers within each industry to ensure the maintenance of our vital export trade. He emphasised that peace was the one condition conducive to general prosperity.

In responding to the toast the Rt. Hon. Oliver Stanley, President of the Board of Trade, acknowledged the encouragement constantly given to the Fair by the Royal Family, which was an expression of the keen interest which they displayed in everything which affected British industry.



The "Electrical Review" stand at Castle Bromwich, Birmingham, at which members of our editorial staff are in attendance to assist visitors to the Fair.

The Fair was the shop-window or showroom for the whole of British industry, and a wonderful showroom it was. But sales to-day needed service as well as showmanship. Our manufacturers had to produce the goods wanted by their customers at prices which those customers could afford to pay, and they knew well that they could not afford to fall behind their competitors in sales service and maintenance service.

The Fair was a vivid proof that our manufacturers were not concentrating all their energies on rearmament or supplying the home market, but were as anxious as ever to do business abroad. It was the earnest hope of all that we would not long be compelled to devote so great a part of the energies of our metal-working and certain other industries to the production of armaments. However great the difficulties of export trade and however strong the temptation of the easy and assured market of rearmament at home, it was in the national as well as the individuals' own interest that they should cultivate those markets while it was not too late. In this connection he referred to the proposal to extend substantially export credit facilities.

Mr. Stanley reminded visitors from overseas that unless they bought from us we could not maintain our position as the world's largest purchaser. Signs were not lacking that there were too many one-way streets in our international commercial traffic. The Government believed that prosperity could return to the world only through the increase of international trade and that it was necessary to reduce the barriers which impeded it. We had been forced to adopt tariffs in a protectionist world, but they were designed only to afford our manufacturers reasonable security in their own market and were never of an exclusive character.

By a policy of trade agreements we had endeavoured to give a downward turn to the steep rise of tariff protection which all over the world prevented the expansion and menaced the existence of international trade. He referred particularly to the Anglo-American agreement.

No individual exporter could fight successfully for markets against a whole nation, and recent developments in trading methods had meant, in effect, that the whole weight of some nations was brought to bear in pushing the sales of their goods in certain markets. We could not stand idly by and see our markets lost. If it were said in other countries that they must export or die, how fatally true was it of us that not just our riches, not just our power, but our existence depended on our international trade. We had no desire to monopolise any markets; we did not want to prevent any country from selling their goods abroad. But we did want and must have our fair share of the export trade of the world. We had no desire for cut-throat competition, backed up by State aid, which in our view could only lead to the impoverishment of the supplier and could be of no ultimate benefit to the consumer. They believed that it could be avoided. Discussions were shortly to take place between representatives of industry here and corresponding industries in Germany. The object was to arrive at agreements likely to promote an increase in trade for both countries in all markets. They hoped and trusted that these conversations would be successful, for the recent conversations between our coal exporters and the German industry showed that such agreement was not beyond the wit of man.

Although British trade last year did not reach the level of 1937, he did not think it rashly optimistic to regard the position to-day as more hopeful than it was a year ago. Business in America appears to be on the up-grade. The decline of prices, if not altogether stopped, was substantially checked; and with any return of confidence in the near future there might well be a rise such as would benefit the primary producing countries and by increasing their purchasing power bring about a recovery in world trade. By doing all they could to remove the fear of war, the nations of the world had it in their power to do more for the progress of their trade and the prosperity of their people, than by all the tariffs and subsidies and quotas that human ingenuity could devise.

Luncheons at Birmingham

Speaking at a luncheon to British and overseas Press representatives at Castle Bromwich last Friday the Earl of Dudley, president of the Engineering and Hardware Section of the B.I.F., said that this year's Fair was a record both in size and the number of exhibitors. This demonstrated very clearly the healthy point of view of manufacturers in this country, who felt that whatever might be the dark clouds which threatened them—and they seemed to lift and lower with remarkable rapidity—it was their duty to go on buying and selling in the normal way. He spoke of the importance of expanding the country's export trade in the face of the present unexampled competition, and said that obviously they would not succeed unless they manufactured the type of goods required abroad, which meant a considerable amount of study. This year's Fair, he thought, showed a particular advance in labour-saving devices for the home, and he believed that it marked a revolution—or reformation—in the conduct of the kitchen.

The Lord Mayor of Birmingham said that both the Lady Mayoress and himself would do all they could to make this year's Fair a greater success than ever.

During the Press visit the new Dudley Suite, which forms part of a general plan for reorganising the catering amenities at Castle Bromwich, was formally opened.

Speaking at a luncheon attended by representatives of a number of electrical associations on Tuesday last, the Minister of Transport (Dr. Burgin) said that the holding of the Fair in these days was a tribute to sanity, faith and optimism. He considered that the future of the electrical industry was bright, healthy and abounding in vigour.

Extensions in generating capacity between now and 1940-41 would amount to 680,000 kW. Last year extensions carried out cost £12 million, as compared with £9¼ million in 1937. Besides the many smaller extensions to be undertaken, new plant was to be installed at Kirkstall, Cardiff, Sheffield, Plymouth and Halifax. The annual amount of loans sanctioned for electrical purposes for the years 1936 and 1937 averaged £12¼ million, while for the first nine months of 1938 alone the figure totalled £17¼ million, of which Birmingham required £2 million.

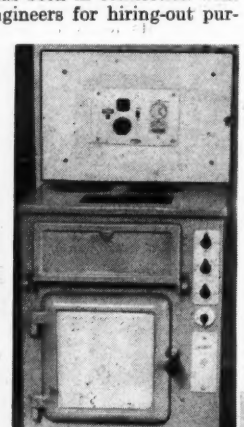
Exports of electrical apparatus during 1938 showed an increase of 38.8 per cent. over 1937. To show an advance at all at a time when most other industries were recording a falling off in trade was a particularly satisfactory sign. South Africa was a most active market. The Post Office, too, was a good customer. Referring to trolley-buses, Dr. Burgin asserted that the electrical industry should supply electricity for them at reasonable prices so as to make them a commercial proposition.

A vote of thanks to Dr. Burgin was proposed by Mr. V. Watlington, director of the British Electrical and Allied Manufacturers' Association.

Heating and Cooking Progress

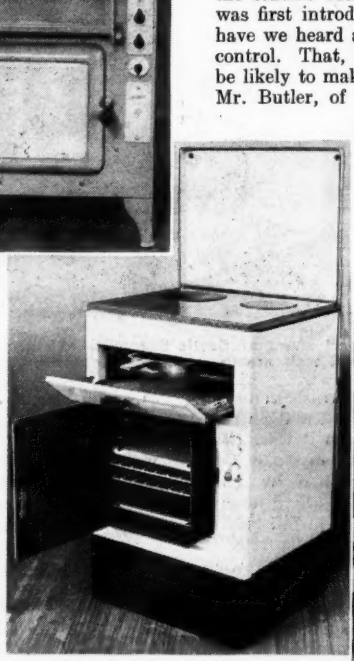
Trends of development indicated at Birmingham

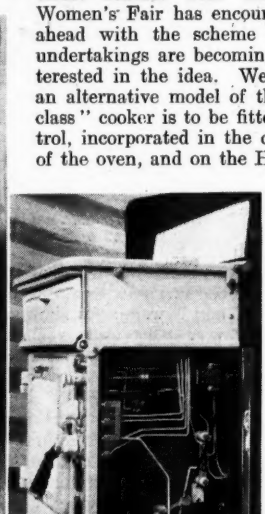
AN intensely interesting point has now been reached in the development of what has been known generally as the superior-finish cooker, with its plain enamels. Up to quite recently the only appreciable business effected by cooker manufacturers as a whole has been in connection with equipment acceptable to supply engineers for hiring-out purposes. These engineers have had a definite bias towards cast-iron which, earlier on, presented enamelling difficulties which were overcome by the now popular mottled-grey.



What little development there has been in the superior-finish type of cooker, mainly in the hands of very few manufacturers, has been in connection with sheet-metal construction which has been more expensive on account of the pressing-tool costs. Now, however, excellent plain finishes are to be seen on castings, no doubt because of more advanced foundry technique, and with this latter development there is increasing talk about the growing field for the "better-class" cooker, mainly for hire-purchase sales. We have used the terms "better-class" and "superior-finish" very reservedly because we do not mean the really expensive cooker which must be made specially—nothing like the specially ordered all-stainless-steel cooker which is shown by the General Electric Co., Ltd., to take an extreme case—but the cooker which could be mass produced, we should say, for just a few pounds extra on the cost of the hiring-scheme cooker.

Mr. Nilson said that his company (G.E.C.) finds that there is a definite field for the better-class cooker and that the hire-purchase market is not the same as the simple hire market. These reasons lie behind the development of the "DC100" cooker, with its cast-iron hob, oven door, and front frame, sheet-metal sides, and flush appearance, with plain or mottled-green finishes. Revo Electric, Ltd., told us that they are finding a big field for the cooker suitable for hire-purchase work, and hence the introduction this year of the "R.75" cooker, which also represents a combination of cast- and sheet-metal work and is finished in plain cream enamel. It has a table-top which becomes a tall splash plate when turned back, particularly simple housings for the hob units, including a separate grill under the hot plates, and a removable oven interior.





Left to right: Hotpoint cooker with time and thermostatic control; "better-class" Revo cooker; and Simplex cooker with thermostat and interlocked main switch

After hearing so much about the better-class cooker development, it was rather more than surprising to learn that Moffats, Ltd., who have been exclusively "plain-finish" people all along, intend to introduce a mottled cooker for hiring purposes. Although this will be designed generally along the lines of the "standard" hiring-scheme cooker for this country, the drop-down door will be retained.

The development of automatic oven temperature control has reached the point at which no doubts about its future are heard anywhere. Progress is slow but steady, and there are still fears among supply engineers about the cookers already out on hire and about maintenance of the thermostat. In referring to the improved "Credastat," with its pilot light above the handle, Mr. Smart, of Simplex, Ltd., said that any Creda cookers made within the last six years can be fitted with the "stat," and Mr. Pym, of the Hotpoint Electrical Appliance Co., Ltd., said that the maintenance cost of the thermostat was no more than that of the three-heat switch. The Rheostatic Co., Ltd., has introduced a cooker thermostat with an incorporated pilot light because of a great demand for such a feature, although up to now the company has held that it is the cooker-maker's job to look after the pilot light.

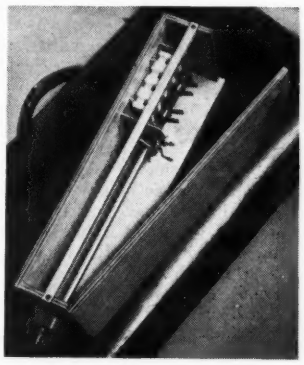
Time control in conjunction with the thermostat is beginning to be talked about more freely, and a few manufacturers are exhibiting cookers equipped for automatic on and off switching. But we have not seen any great enthusiasm for the scheme such as was apparent when thermostatic control was first introduced a few years ago. Nor, for that matter, have we heard any severe criticisms as we did of temperature control. That, no doubt, is because time control would not be likely to make demands for modifications in cooker design. Mr. Butler, of the Horstmann Gear Co., Ltd., told us that direct contact with the public at the Women's Fair has encouraged them to go ahead with the scheme and that supply undertakings are becoming increasingly interested in the idea. We understand that an alternative model of the Revo "better-class" cooker is to be fitted with time control, incorporated in the cooker at the side of the oven, and on the Hotpoint stand we saw a cooker with a control unit, including time switching arrangements, fitted in the splash plate. To sum up, we should say that while we regard thermostatic control as essential to the future development of electric cooking, time control is not likely to be more than a refinement.

For many years, every now and then, a cooker with a main switch incorporated in it has been shown at the Fair, but at Birmingham this year there are several, and we have found considerable enthusiasm for the scheme. Simplex say that the cooker itself is the local place for the main switch and that the safety factor can be looked after by interlocking. The G.E.C. showed us a demonstration model illustrating how the switch can be interlocked easily with the side of the cooker.

There is evidence that the light-metal enclosed hot plate is creating an increasing interest, and on the stand of the Jackson Electric Stove Co., Ltd., we learnt that a large number of supply undertakings have adopted the "Backer-Jackson" plate since its introduction last year. The main appeal, we were told, is that any type of utensil can be used on it, while the radiant-heat feature is also giving it a "pull." We saw

an English Electric cooker fitted with a 2,000-W circular Backer plate.

We have heard some talk about the advisability of refraining from references to quicker heating, but we have no hesitation in saying that, so long as gas-ring competition remains, talk of quicker heating will indicate a healthy state of affairs in the electrical industry. A new Revo boiling plate is of light-metal, enclosed, and corrugated construction, but, unlike the Backer plate, the embedded element has no tube between itself and the plate.



G.E.C. demonstration model of incorporated cooker switch

Quicker initial heating and lower cost characterise this particular method of construction. Rigidity of the whole is afforded by welding together the flat pieces of the top and bottom sections of the casing where they touch at the plate periphery and between the coils. Moffats told us that the "Red-Spot" (high-load, solid and embedded) and the "Cookquik" (light-metal enclosed, non-embedded) appear to them to be equally popular.

Space-heating Ideas

Apart from a few tubular heaters and self-contained wall panels, there is very little low-temperature heating equipment on show this year, except for convectors, which, generally speaking, are not put forward as a contribution to any definite space-heating scheme in principle. An outstanding exception to this generalisation is the Thermovent, for E. K. Cole, Ltd., are enthusiastic about the possibilities of low-temperature heating with their convectors. These equipments are automatically controlled with the thermostat incorporated in the equipment at the bottom or air-intake, but operating definitely at room temperature. The exit temperature is 180 deg. F., and the air flow is 3,500 cu. ft. per kW per hour, according to the room temperature. We saw two new metal heavy-duty convectors suitable for industrial work on this stand with the same operating conditions as those of the company's domestic models. One is an inset pattern while the other is a portable unit.

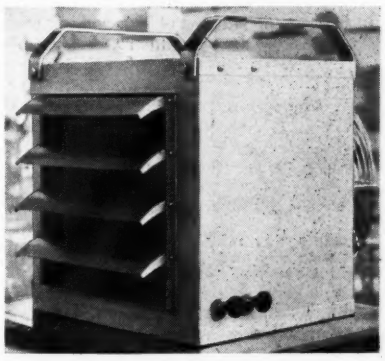
We believe that much possible business to convector makers generally is being lost because of the diversity and apparent lack of ideas about loadings and operating conditions generally and the failure to put forward definite recommendations as to the proper use of the equipment. We stress this point because of the appreciation that every convector we have seen at the Fair can be used (rightly or wrongly) as either high-temperature or low-temperature equipment with regard to final air temperature.

Bratt Colbran "Sunrise" fire with "fuel" illuminated by elements

Ideas are very varied, too, about the correct method of control of convection heating. Mr. Fletcher, of George Bray & Co., Ltd., gave it as his personal opinion that the right place to fix the thermostat is in the room somewhere at about head level. Mr. Grant, of the Rheostatic Co., Ltd., said that the final control for any form of heating must be the room temperature to give satisfaction, and that for precise operation the "stat" should be located in the room. But, he said, with great care in design, so as to avoid thermostat "wandering" as the result of radiant-heat influence from the convector element, the thermostat in the convector housing was justifiable in that it could give reasonably satisfactory results based on room temperature. The British Thermostat Co., Ltd., has introduced a simple thermostat of the bi-metal type in skeleton form for incorporation in convectors. Air temperature setting is effected by a cam which adjusts the fixed contact for the distance between the fixed and moving contacts in the off position. A permanent magnet affords snap action, and the rating is 2 kW at 250 V, AC.

The introduction of air circulation, as against convection, last year for domestic use does not appear to have made its mark yet, but evidently the idea is still interesting some engineers and manufacturers. Mr. Fletcher agreed that air circulation is particularly suitable for such a structure as the B.I.F. building at Castle Bromwich, where local conditions are quite uncontrollable, and from that point of view he would draw a very definite line between convection and air circulation. On the other hand, he believes there is a point in the claims for even heat distribution by circulation where there is proper design of the equipment as a heating system.

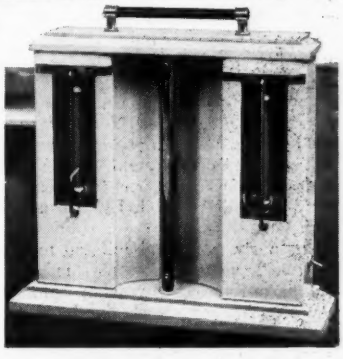
The "Projectaire" of British Trane, Ltd., is a good example of an air circulation unit for industrial use. It is designed to project heated air from high level to floor, and is quite effective at 40 ft. high. Loaded at 10 kW to 60 kW, it effects air flows of from 710 to 5,000 cu. ft. per min. Air enters at each of the four sides where the elements are arranged, and passes down at high velocity through the central fan. A small impeller cools the motor. We believe that industrially the future of hot-air circulation will be largely bound up with air conditioning, and we are very sorry to see so little of the latter development represented. The "Humidaire" may be described as a partial air-conditioning unit. The fan at the back passes air first over the "open" elements and then over absorbent pads saturated with water. Humidifying or dehumidifying is effected according to whether the water is above or below the temperature of the entering air dewpoint. The loading is 20 kW, and 1,150 cu. ft. of air per min. is passed.



The "Humidaire 2" partial air-conditioning unit

Present ideas on the subject of low-temperature heating and its association with air conditioning are also very conflicting and we heard low-temperature heating referred to as implying a temperature condition of the air in a room, low wattage density of heating elements, low inlet and exit temperatures, and so on. Mr. Carter, of the British Thermostat Co., Ltd., told us of the great apathy he had found among electrical contractors generally, excluding the larger contracting concerns who specialise in heating installation work, towards electric space heating on a system basis. We also heard contractors criticised generally for being too willing to leave space-heating matters in the hands of the steam and hot-water heating and ventilating engineers.

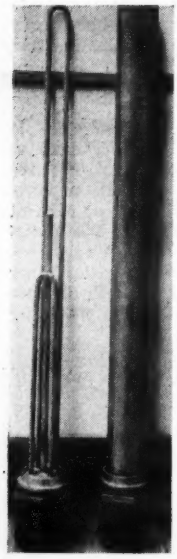
The British Thermostat Co. has introduced a humidistat for use where relative humidity only is to be controlled. The sensitive element is a strip of special hygroscopic material held under tension, and expansion or contraction of the strip with change of relative humidity operates the switch arm. Because of the difficulties with the larger types of central heating plant of controlling space heating owing to the large differences in the heat requirements between one department and another, we were very glad to learn of the new all-electric compensator control by the Rheostatic Co., which renders heating plant sensitive to outside atmosphere conditions (sun, wind, rain, and frost). An outside "pilot" automatically selects a suitable flow-water temperature to balance the prevailing heat losses and causes the boiler regulator to operate the temperature selected. The scheme also incorporates a third unit, which is usually fixed in the boiler house and provides a means of adjusting the circuit to individual requirements of heating installations and buildings.



The "Carrolite" (Carron) reflector fire

The electric fire trend towards reflector equipment is now

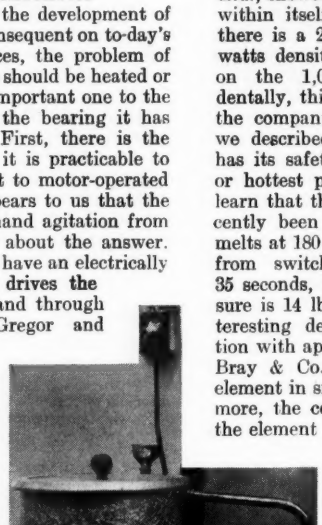
very marked indeed. Most models have rod-type elements with separate troughs, either horizontal or vertical, and are available as inset or portable equipments, with or without imitation fuel. There is also the usual spate of new ideas on "psychological" effect—imitation fuel, glow effect, and so on. The new "Woodberry" (Berry's Electric, Ltd.) afforded us the opportunity of studying the idea of placing a mirror at the back of the fuel. The scheme is to be introduced on all the company's standard imitation-fuel fires. The "Sunrise" of Bratt, Colbran, Ltd., is the first imitation-fuel fire we have seen without some separate form of illumination for the fuel, i.e., apart from the elements. There is a short element at the back of each lump of coal, and the heat is first projected to the deep back reflector.



Hotpoint circulator with day and night elements

Washing Machines

With the spurt in the development of washing machines consequent on to-day's more reasonable prices, the problem of whether the machine should be heated or not is becoming an important one to the industry because of the bearing it has on water heating. First, there is the question of whether it is practicable to fit heating equipment to motor-operated machines, and it appears to us that the recently introduced hand agitation from the top has brought about the answer. Cotto Products, Ltd., have an electrically heated model which drives the agitator at the top and through the door. MacGregor and McCallum, who do not make heated machines, said that there are no manufacturing difficulties in the production of heated machines. As to whether water-heating facilities on the machine itself are required or not there are mainly two schools of thought. One, as expressed by Burco, Ltd., is that the heated machine provides the means of sterilising clothes, and it is said most housewives insist that clothes should be boiled. The other school may be represented by the comments we heard on the MacGregor and McCallum stand, namely, a washing machine which heats its water has the marked disadvantage that after a change of water a delay of one to two hours in the washing operations is necessary because of the time required for reheating.

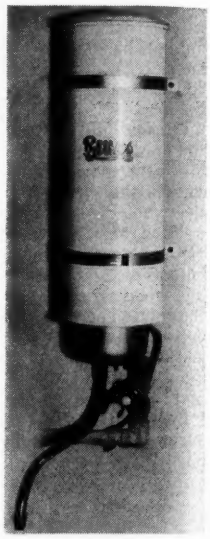


Burco bath boiler with new main wall switch

Good washing results call for generous quantities of warm, clean rinse water, and this points to the necessity for some source of water heating other than the machine itself. The Ace & Cotto non-heated motor-driven machines are excellent examples of the lower-priced machines of to-day. We feel a little diffident about continuing to talk about lower-priced machines generally, as was really necessary ten years ago when 40 gns. was a common price for a washing machine, because of the risk of creating confusion between what has been a necessary call for general price reduction and the price reduction as the result of normal trade competition and varied classes of equipment. We feel that to-day's prices have reached a level when further reductions can be brought about by the results of normal trading, and this view seems to be confirmed by the introduction by Wilkins & Mitchell, Ltd., of a de luxe model costing only 3 gns. more than the company's standard production.

Obviously, the hand-agitated machine has got a good hold, and we have seen a Burco model similar to that introduced last year, but fitted with an Acme wringer.

With the continued development of high-loading water heaters, we appear to be fast nearing, or shall we say returning, to geyser heating, so much dreaded by the supply engineer a few years ago. The Hotpoint "constant hot water unit" is loaded at 4 kW, and it will give a constant flow of 2.5 pints of water per minute with a temperature rise of 70 deg. F. Again, the new "Quick Service" heater of Berry's Electric has a loading of 2,000 W, and this was described to us as practically a reproduction in miniature of the company's 4-kW 12-gal. bath heater. While we agree that there is no doubt a field for such high-loading equipments, we cannot believe that the supply section of the industry will fail to exert sufficient influence to ensure that the thermal-storage water heater with its outstanding advantages for supply work maintains its position. We think the idea behind the development of the Hotpoint dual-element circulator is sound. The short 1-kW element is for day use, and the long 1-kW element, of which only the bottom 16 in. is "active," serves as a base heater particularly suitable for exclusive night use.

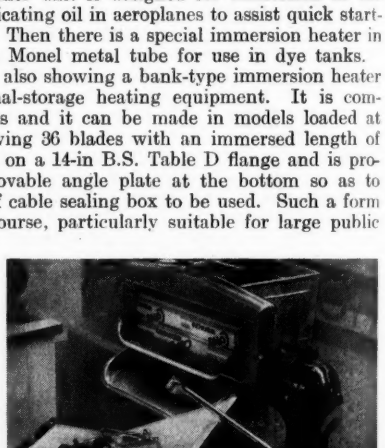


Berry's Electric "Quick Service" heater

One hears nowadays of contracts being placed for kettles at the rate of several thousand per season, and if there is one domestic electrical appliance as firmly rooted with regard to manufacture and service as the inimitable iron it is the kettle. Most of the many novelties are by way of refinements, but an outstanding example of the utility development is a new-shaped element which Mr. Fraser, of Bulpitt & Sons, Ltd., showed us. The loop is turned within itself, with the result that there is a 2,000-W loading, with a watts density no higher than that on the 1,000-W element. Incidentally, this element is fitted with the company's new cut-out which we described last year and which has its safety device at the centre or hottest point of the loop. We learn that this safety device has recently been improved. The alloy melts at 180 deg. C., the time delay from switching on dry is only 35 seconds, and the throw-off pressure is 14 lb. One of the most interesting developments in connection with appliance and equipment elements is that by George Bray & Co., who are now making the embedded tubular element in smaller diameters than the standard $\frac{3}{8}$ in. What is more, the company is able to give a definite guarantee that the element is dead central in the tube. The element is made up in a variety of forms. A unit with a spiral of $\frac{3}{16}$-in. tube is placed between the field coils of an electric motor to prevent condensation. Another unit is designed for immersion in the lubricating oil in aeroplanes to assist quick starting. Then there is a special immersion heater in $\frac{3}{8}$-in. Monel metal tube for use in dye tanks.

This company is also showing a bank-type immersion heater suitable for thermal-storage heating equipment. It is complete with bus-bars and it can be made in models loaded at up to 108 kW, having 36 blades with an immersed length of $33\frac{1}{2}$ in. It is fixed on a 14-in B.S. Table D flange and is provided with a removable angle plate at the bottom so as to enable any form of cable sealing box to be used. Such a form of heating is, of course, particularly suitable for large public and industrial buildings and for structures of this class the fan-driven unit type of heater is often recommended.

The "Calorier" unit heater displayed by Standard & Pochin Bros. Ltd., is of this class. It can be equipped for electric heating by either exposed or enclosed elements. Model No. 812 is loaded at 15 kW with "open" elements, giving an output of 51,200 BThU per hour, and 18 kW with enclosed elements, giving an output of 61,400 BThU per hour. A low-speed or a high-speed motor can be fitted with volumes of either 555 or 760 cu. ft. per minute, respectively.



Cotto Products low-priced washing machine

The "Spirette" unit heater shown by the Spiral Tube & Components Co., Ltd., is steam heated and equipped with a "Spiral Tube" heating element for steam up to 150 lb./sq. in. The totally enclosed motor is said to have a very low consumption and to be silent in operation. With steam at 15 lb. per sq. in. and an initial air temperature of 30 deg. F., the output is 45,500 BThU per hour.

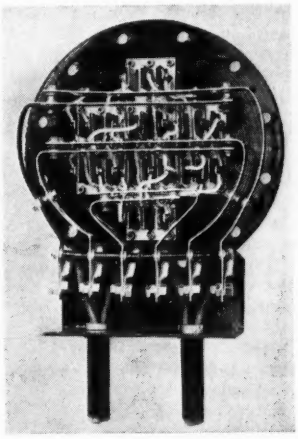
Some Industrial Developments

New ideas at Castle Bromwich

FOR a change fair weather favoured Fair-goers on the first day. A mild day with bright sunshine was matched by many of the bright illumination displays of the exhibitors. The B.T.H. stand, for instance, is devoted solely to lamps and lanterns, the lighting effects of the interior decoration being particularly striking. Attached to the black ceiling are artificial blooms and foliage which are made to stand out in many colours when ultra-violet light is directed unobtrusively upward from a central pedestal with quite charming effect.

We are informed by Evenlite, Ltd., that the floodlighting of the United Kingdom Pavilion at the New York World's Fair is being carried out with line-filament lamps specially made by this firm for 110 V and sent to America for the purpose. These gas-filled lamps have a large coiled filament and are made in six sizes from 150 to 1,000 W with a screw cap for mounting horizontally to obtain proper focusing in special reflectors. "Evenlite" tubular lamps in many colours for decorative illumination have a sparkling attraction due to their ribbed glass combined with the method of supporting the filament. They are made in any shape from 9 to 48 in. long and in diameters of 20, 30, 40 and 50 mm.

Of topical interest just now is the G.E.C. self-contained R.A.F. aerodrome floodlighting set, which consists of two 2-kW line-filament lamps each with its own reflector mounted one above the other in a metal housing (Scientific Projections, Ltd.) which is adjustable and rotatable. The whole is mounted on a four-wheel trailer, together with the control gear and 4-kW generator driven by an internal combustion engine.



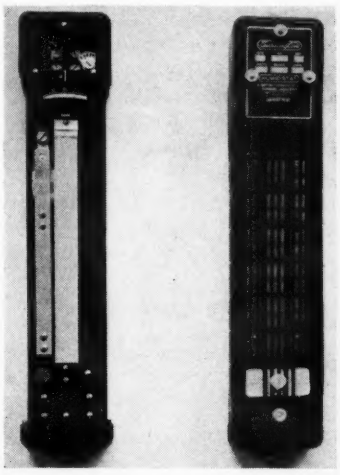
Bank type heater for thermal storage plant (Geo. Bray) (See p. 274)

For street lighting there is the new "Uniway" back cut-off lantern that gives a 400-W result with 125 W consumption. It is specially designed for one-way roads only and is intended to be mounted so as to direct light towards oncoming traffic, so causing a bright road surface. The totally enclosed housing is waterproof and arranged for universal side-entry mounting, with auto-prefocusing and orthoptic sights can be attached for aiming the beam in the correct direction. The "Di-fractor" lantern is another new model of unconventional design, fitted with a ribbed well glass that is smooth on both sides and so easily kept clean. This is achieved by cementing two glasses together. A safety catch of the drop-down type is fitted and the circular top of the lantern lifts off, all casings being made of a light alloy, suitable for 125- to 400-W mercury-discharge lamps.

The G.E.C. is also demonstrating the latest super-high-pressure air-cooled mercury discharge lamp of 500 W, which is three times as bright as a 500-W filament lamp. It is suitable for television, beacons, cinema and other projection purposes. A new range of photographic studio protectors and illuminators is also available.

A four-high steel rolling mill has not before been seen at the Fair. The example shown by Sir James Farmer Norton & Co., Ltd. (makers of wire drawing plant) is a reminder that America and Germany are not the only sources of such mills. This exhibit is capable of cold rolling steel strip up to 10 in. wide and is designed for English Electric DC motor drive of 40 HP with a speed range of two to one, from 600 to 1,200 RPM, giving a roll speed of 120 ft. per minute, coupled with power-driven coiling equipment and a collapsible drum. The drive is through a totally enclosed gear box, the two backing rolls being 12.75 in. in diameter, self-aligning in roller bearings. The two smaller live rolls have bronze bearings with a patented method of alignment. The larger rolls are surface cooled by a liquid applied by pads and pumped up from a sump below. Control is by push-buttons with low speed and pre-set acceleration rate. The guides and cleaner are mounted on a table that swings clear to one side to facilitate roll setting.

Wild-Barfield electrode salt baths for hardening high-speed steel, mainly for tool makers though quite big tools can be handled, is a revival that suggests an important trend, offering advantages over decarburising and scaling, rapidity of heating giving a clean finish. The outer case is of thick rolled mild steel, braced and mounted on rollers with lifting jacks to raise it up to the hood when in position. On the inside of the case is a layer of insulating bricks, then a layer of firebricks. The actual bath lining inside the firebricks is of special material. Recesses are provided in this lining for the main electrodes of pure iron for the immersed portion with horizontal lead-out of mild steel for connecting to the busbars at the back of the bath.



The "Humidistat" (British Thermostat Co.) (See p. 273)

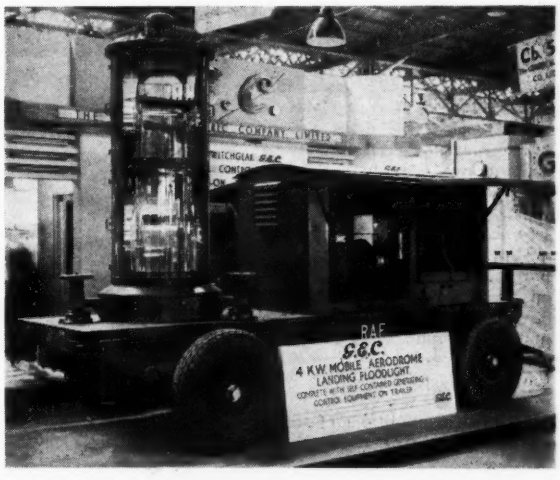
To safeguard the furnace operator and those working near the bath from any spurting of salt, a hood covers the bath and is connected to a fan box which exhausts the fumes to atmosphere through ducting. A feature of the hood and fume extractor is that they are mounted quite separately from the bath, which is mounted on rollers and so can be withdrawn from the hood.

The electrodes are supplied at low voltage from a tapped transformer fitted with an on-load tap-changing switch, ammeter and pilot lamp. The secondary connections to the electrodes are of taped copper strap and a radiation pyrometer is provided with the receiving tube mounted at the top of the hood. The fume extractor ensures consistent temperature indication.

As the correct hardening of tools in a salt bath is dependent to a large extent on the time of treatment, an 8-in. dial electric clock with a long seconds hand enables accurate timing to be effected. The bath is started up by placing a layer of salt in the bottom and passing current through a carbon fixed between the two auxiliary electrodes. This causes the carbon to glow and melt the salt so that the conductivity of the salt increases rapidly. Further salt is added until the bath contains enough molten salt for the main electrodes to be used. The auxiliary electrodes are then removed.

A salt bath of 6 in. diameter and 9 in. deep is rated at 24 kVA, or 8 by 14 in. at 40 kVA, or 12 by 18 in. at 70 kVA.

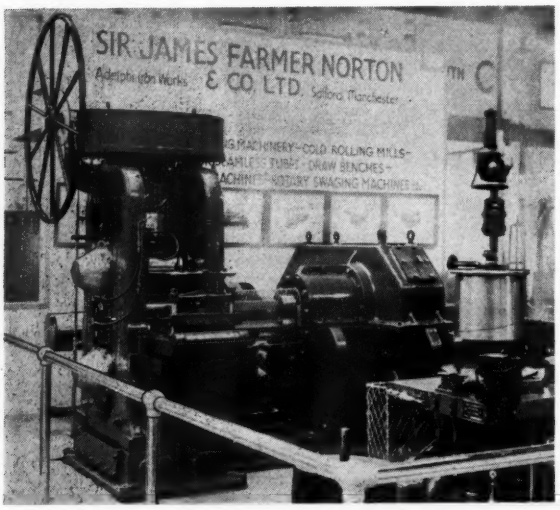
When cinema arc rectifiers were first introduced by the Westinghouse Brake & Signal Co., Ltd., no provision was made for single-phase supply. To overcome this disadvantage, a patented static phase convertor has now been developed. This can be supplied as an extra to operate a three-phase rectifier from a single-phase supply, has no moving parts whatever, and operates at high efficiency. The power factor is also at least as good, while the ripple in the output current is indistinguishable from that of a standard three-phase installation.



Aerodrome floodlighting set (G.E.C.)

Such a static phase convertor will not only change the number of phases, but can simultaneously be used to change the voltage. It is therefore suitable for use on any single-phase mains within the range of 200 to 480 V and will provide a three-phase output at 400 V. All the apparatus is metal-clad and is provided with conduit entries to comply with Home Office and local authorities' requirements.

Another definite trend of development is represented by under-floor ducts for wiring. The Simplex system has been



Cold rolling strip mill (Sir James Farmer Norton & Co.)

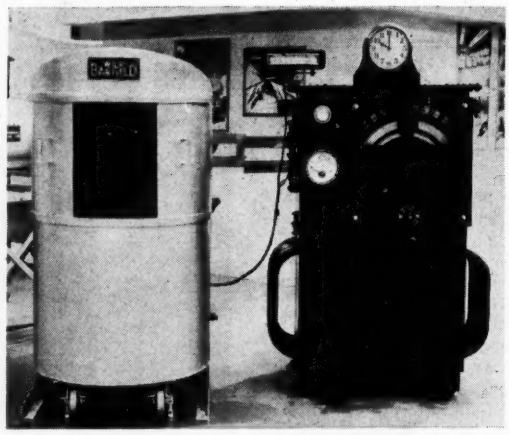
referred to on previous occasions and the G.E.C. is also exhibiting samples of ducting under the floor of its stand, covered with tough glass and illuminated internally.

Speed variation by means of AC commutator motors with fixed brushes and an external regulator represents a new principle demonstrated by Higgs Motors, Ltd. Such machines can also be used to provide a leading power factor; they contain an extra winding to stop sparking at the fixed brushes and the separate induction regulator is made in the form of a vertical cylinder with a fan blowing cooling air through it upwards, so saving floor space and avoiding oil immersion.

A variation up to 10 :1 can easily be arranged for and motors can be supplied with even larger speed variation. The design is such that a much smaller number of brushes than is usual on commutator motors is required, and there are no slip-rings and no slip-ring brushgear, which reduces the upkeep cost.

The rotor externally resembles that of a DC motor. In addition to the normal winding there is also a special patented commutating winding placed in the slots underneath the main winding and connected to the same commutator. The stator of the machine is fed from the main supply in a similar manner to an ordinary induction motor. In addition there is an auxiliary winding on the stator which is connected in series with the brushgear and the regulator. The primary of the regulator is also fed from the main supply and the auxiliary winding of the stator is connected to one end of the secondary winding of the regulator, the other end of the secondary winding being connected to the commutator. The purpose of the auxiliary winding on the stator is to further increase the power factor of the motor throughout its range of speeds. Under certain conditions the power factor is slightly leading. Since the machine is sparkless under all conditions of speed and load the maintenance of the brushgear is reduced to the minimum. This is a very important point.

The regulator consists of two ordinary induction regulators connected in series on their low-voltage sides. This is necessary to provide a variable voltage without a phase shift, which feature also maintains a high efficiency and power factor. Each unit has a wound stator and rotor which can rotate through 180 deg. The position of the rotor of this induction regulator relative to its stator determines the speed at which the motor will run. The windings of the regulator are cooled by a built-in auxiliary fan motor. Normally the fan fitted to the commutator motor is sufficient for ventilation and cooling purposes where the speed range is not greater than approximately 3 to 1.

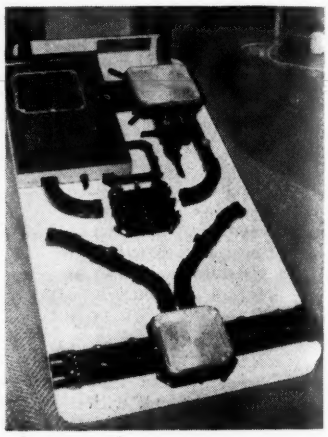


Electrode high-speed salt-bath steel hardening furnace (Wild-Barfield)

A new range of distribution boards is shown by the English Electric Co., Ltd., in flush or wall mounting and combination fuse and tumbler switch patterns. They are made for multi-ways up to 25 A at 250 V, the little fuses being end-indicating and tools are not required for re-fusing, while the interiors are neatly arranged for convenience in cabling. There is also a new line of inexpensive ironclad switches and fused-switches for 30, 60 and 100 A at 500 V, as well as the first samples of new 500- and 800-A combination fuse-switches incorporating high rupturing capacity fuses of the non-deteriorating cartridge type with interlocked door to the chamber and plenty of room in the cable box below. A handle at the side withdraws the fused links from the busbars behind.

The Class OLC metalclad horizontal draw-out switchgear for up to 800 A at 11,000 V has been so modified as to bring the current transformers and instrument panel to the front on the movable portion of the gear. The newest item is the Class OB high breaking capacity three-phase air-break switchgear, with breaking capacity of 60,000 A (RMS) which means 50,000 kVA at 660 V. This design is an early indication of the thought now being given to the possibility of doing without oil immersion and it is logical to start with the low-voltage side, particularly in industrial and other sub-stations where the increased fire safety factor is a consideration of major importance.

The main contacts are of the butt-type comprising a moving wedge-shaped block that in service bridges two fixed contacts connected one to each of the circuit-breaker terminals. The moving block is bolted to the moving contact assembly so that full self-alignment is allowed and it is heavily spring-loaded to obtain a perfect high-pressure line contact, which also makes an extremely fast break on opening circuit. The actual contact surfaces are of silver.



Components of underfloor duct system (Simplex Electric Co.)

An arcing contact and a horn-shaped arcing tip are provided on each pole, the moving and the stationary parts being in "monobloc" with the corresponding parts of the main contacts. Thus the long flexible connection to the moving arcing contacts is avoided, and the necessary alignment obtained by the use of a "floating" mounting for the stationary contacts. The contacts and associated tip are formed by mounting inserts of special arc-resisting non-pitting alloy on a substantial base, that for the moving parts being bolted solidly to the main moving contact carrier. The stationary base is spring-mounted on the panel within a housing so that considerable movement both axially and radially is allowed. High contact pressure is thus obtained and the correct sequence of breaks ensured. An insulating shield between the stationary main and arcing contacts prevents any possible downward "spilling" of the arc.

De-ionising arc splitters are enclosed within open-ended arc-chutes with internal barriers arranged to form a series of parallel narrow vertical vents. A segment is cut away in each plate, so that a tapering slot is formed in which the arc is blown and subsequently split up and de-ionised by the plates, so preventing its restriking after a zero pause. Insulated iron inserts are placed at the upper end of the internal barriers, to ensure extinction within the enclosure.

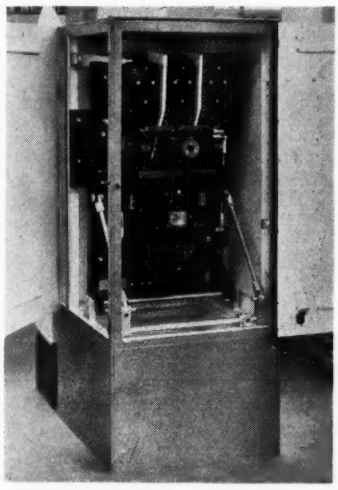
The moving contact assemblies of the single poles are operated simultaneously by an insulated coupling bar. The mechanism is trip free, and piston-type air dashpot buffers are used to absorb the thrust at the end of the opening stroke. Closing can be effected manually by a detachable pole, or by DC solenoid. Either a local trip handle, or an electrically-operated trip coil can be used, and also the usual automatic protective trips.

Class OB cubicle-type switch units can be arranged singly, in multi-panel switch-boards, or in combination with fuse-switchgear. All current-carrying parts are within the earthed metal enclosure, and the operating and isolating mechanisms are protected by mechanical interlocks.

A slate panel carries the air circuit-breaker behind which are the busbars and cable circuit connectors. The panel is hinged at the bottom to enable it to be rocked forward by a detachable handle, so that a slight forward movement of the panel serves to isolate the circuit-breaker. Positive mechanical interlocks allow movement of the panel only when the circuit-breaker is open.

Further forward movement of the panel is possible when the access door is opened by disconnecting the retaining links, the circuit-breaker then being in a convenient position for inspection or maintenance attention.

Quite inexpensive and attractive are the miniature circuit-breakers of the Combi Electric Co., Ltd., for 5 and 15 A, which have been submitted to tests at the N.P.L. They are the equivalent of a switch, three-pin plug and fuse in one complete unit of modest dimensions and lighter construction than iron-clad distribution fuse boxes of the conventional type. A small lever for each circuit protrudes through the cover of the box and they have merely to be pressed down for re-establishment of the circuits.



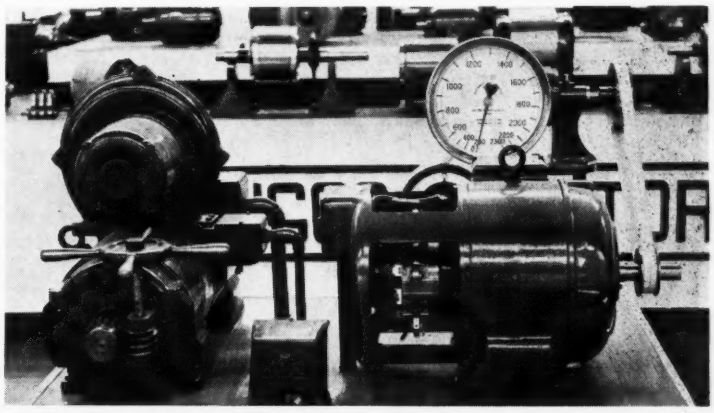
High-rupturing-capacity air-break circuit-breaker (English Electric Co.)

In the event of a really heavy overload or short-circuit the switch cannot be reset until the fault has been cleared. In the case of the switch-plug unit withdrawal of the plug causes the switch to trip as well as overload and short-circuit, while single- and triple-pole motor starters have no-voltage release in addition. In this case continuously variable current setting is provided for at all voltages for motors of from 0.25 to 2 HP, direct-on starting, so reducing the types of breaker that have to be stocked.

Overhead Doors (Great Britain), Ltd., produce horizontal sections for folding upward into the roof of private garages or factory premises. They are controlled by push buttons and key switches can be added if needed in conjunction with limit switches. A small motor direct-shaft drive furnishes the power with provision for the door to remain partly open to any desired extent.

One of the items shown by the group of manufacturers represented by the Incandescent Heat Co., Ltd., is a new Lee-Wilson gas-fired cylindrical furnace for the bright annealing of wire and strip in coils. Electric ignition is provided as being safer and trouble free; at the top of each of the vertical radiant combustion tubes is inserted a sparking plug, which are connected in pairs to half their number of magneto-transformers attached to the outside shell of the furnace and connected to the electricity mains. On the same company's stand electrically heated vertical recirculating low-temperature annealing furnaces (Metalectric Furnaces, Ltd.) are represented by a 4-kW model of a range extending up to 35 kW, while there is a model of a three-phase electrode melting furnace to which "Metalectric-Tagliaferri" electro-hydraulic automatic regulation is applicable, together with a removable hearth and charging skip.

In addition to switch and control gear the Morecambe Electrical Equipment Co., Ltd., is displaying stop-motion and valve closing apparatus for quickly stopping steam and internal-combustion engines, steam and water turbines, or releasing vacuum. In opening the valve a spring is coiled round the spindle (like winding a clock) so that when the tension of the spring is released it closes the valve sharply. The release is effected by a ratchet device actuated by an armature, the coil of which is energised electrically by pressing a button fixed in any convenient position. Low voltage only, either from a battery or mains, is applied to the circuit. Small auxiliary overspeed governors mounted on a pillar and driven from the main shaft of the prime mover are made automatically to stop the engine when excess speed causes the governor to move a lever operating the valve closing circuit.



Demonstration model of variable speed AC commutator motor with fixed-brushes and external regulator (Higgs Motors)

Besides electric carpet shampoo and floor scrubbing machines, R. G. Dixon & Co., Ltd., have an all-British motor-driven suction squeegee for collecting water from floors after scrubbing. The 14,000-r.p.m. universal type 400-W ventilated motor drives vertically a water-lift fan with blades specially shaped to be unaffected by suds. A small double-pole switch is attached to the rubber-covered handle of the machine, which can be detached and to which is fixed the tank into which the water is delivered. It contains baffles to prevent suds being ejected through the air vent; when the latter is covered by the user's hand the water collected in the tank is blown out through a second pipe, so providing an easy means of emptying. The welded sheet steel tank has an inspection door at the side and can be fitted with a hose for extracting water from carpets after shampooing. This machine will pick up water from 100 sq. ft. of floor per min.

It seems fitting to conclude with a reference to the stand of the Birmingham Corporation Electricity Department, emphasising landmarks in the history of the undertaking and with a built-in loud speaker "telling the story." The number of consumers has grown from 11,435 in 1919 to 251,864 in 1938, while the energy sold increased from 140,938,720 in 1919 to 778,084,915 kWh in 1938. The number of cookers installed rose from 101 in 1925 to 13,807 in 1938, and the length of mains laid from 552 miles in 1919 to 3,373 miles in 1939.

In the Fair as a whole over two thousand exhibitors represent nearly eighty British trades, Dominion and Colonial included, combining to make a display as varied as it is impressive. It is now ten times its original size, having been held annually since 1915, and the importance of this exhibition lies in the fact that it represents the products of one-quarter of the globe to the whole world.

[The illustrations in the foregoing articles are all ELECTRICAL REVIEW photographs.]

Finnish Electrical Machinery Imports

In a report to the Department of Overseas Trade on economic and commercial conditions in Finland (Stationery Office, 1s. 6d. net), Mr. E. R. Lingeman (Commercial Secretary to H.M. Legation at Helsingfors) states that with the march of industrial expansion in Finland the import trade in machinery and other manufactures in this group increased at a fairly even pace up to 1936. In 1937 there was an advance of 76 per cent., imports rising in value to Fmk. 1,054 million. Imports of electrical machinery rose from Fmk. 50.9 million in 1935 to Fmk. 145.6 million in 1937, but the United Kingdom's share fell from 4.9 per cent. in 1935 to 4.5 per cent. in 1937. Imports of metal sheathed electric cables also rose from Fmk. 11.7 million in 1935 to Fmk. 31.5 million in 1937, but here again the United Kingdom's share fell from 13.9 to 0.7 per cent. Mr. Lingeman states that the chief contributing factor to the unfavourable development in the United Kingdom's share of the machinery import market is the low prices quoted by her most serious competitors, but the difficulty of obtaining delivery from the United Kingdom has also played its part.

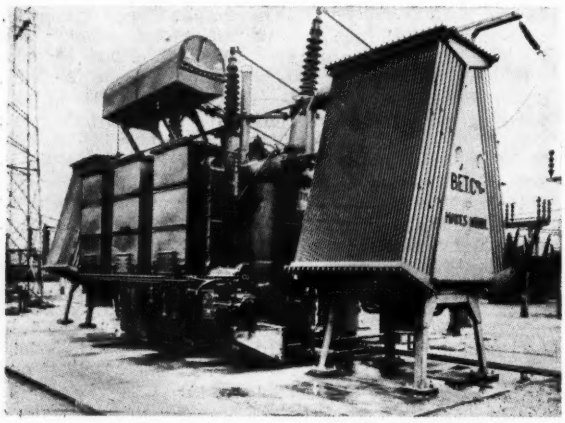
Large Transformer for the C.E.B.

A 45,000-kW 132/33-kV ON/OFB transformer supplied recently to the Central Electricity Board for the grid site at Kearsley in the area of the Lancashire E.P. Co. was built to Kennedy & Donkin's specification by the British Electric Transformer Co., Ltd. Owing to transport difficulties and in order to minimise the height of a five-limb core construction was adopted. When the end core was built up the yokes and end limbs were stepped in order to keep flux densities consistent throughout the magnetic circuit. The clamping bolts do not go through the yokes but over and under the latter, and thus do not interfere with the magnetic circuit. For cooling the iron, oil ducts, which are interconnected by transverse ducts, traverse the width of the sections of core plates.

The windings are of the double-concentric type with reinforced end turns. Tapping leads from the inside windings are taken via oil-tight bushings in the main-tank side to a selector switch in a separate tank. The bottoms of the coil stacks are supported by elephantide blocks with ducts to facilitate oil circulation. The insulating blocks are supported by a steel platform perforated at intervals that coincide with the oil ducts in the windings. On the top of the limb the windings are clamped down by steel rings, insulated and spaced from the windings by elephantide blocks. Clamping the top yoke to the fabricated structure are heavy screws, which are accessible from the top of the tank. As the windings were fully shrunk before the transformer left the works, however, the clamping screws will not need tightening for a considerable period.

The auto balancers of the on-load tap-changing gear are contained in separate tanks bolted to the main tank and supported by structural steel brackets. Three single-phase balancers are used and above each is housed a selector switch. Below the balancer tank and attached to it at an accessible level is the diverter switch, which is provided with a windlass-operated drop-down tank. The motor-operating pillar is carried on a structure built out from the end of the tank.

Two of the company's "A" type coolers (one at each end of the transformer) permit 50 per cent. of full load to be carried before forced cooling is needed. A fan is fitted at the base



A special B.E.T. transformer for the Kearsley grid sub-station of the C.E.B.

of each cooler and an oil pump at each end of the tank adjacent. The forced cooling equipment is automatically controlled by an adjustable thermostat, which allows for a differential up to 30 deg. C.

The heated automatic control cubicle, with extended height to take the oil- and winding-temperature thermometers, is attached to a structure built out from the end of the tank. Wiring for all auxiliary circuits is terminated in a multi-way terminal box attached to the main tank. The coolers are the only parts requiring separate foundations. The oil gauge, which is 17 ft. from ground level and connected to the conservator well above hot-oil level, interrelates the level of the oil with its temperature and is read in conjunction with the oil-temperature thermometer. Thus, if the thermometer reads 50 deg. C., the pointer of the oil gauge should register the corresponding level. The entire unit is mounted on anti-vibration pads consisting of sandwiches of cork and lead. The total weight of the whole equipment complete with oil is approximately 140 tons.

Battery Vehicles

E.D.A. Display at Manchester

THE Lady Mayoress of Manchester (Miss Hodsman) on Tuesday opened the third annual electric vehicle exhibition held under the auspices of the North-Western Section of E.D.A. in a strikingly novel way. Instead of making a speech, she just drove down a covered roadway into the Manchester Corporation demonstration workshops in Dickinson Street.

There were seventeen vehicles on parade, the makers being Partridge, Wilson & Co., Ltd.; Metropolitan-Vickers Electrical

A general view of the electric vehicle exhibition held at Manchester

Co., Ltd.; Associated Electric Vehicle Manufacturers, Ltd.; Cleco Electric Industries, Ltd.; and Murphy Cars & Trucks, Ltd. In addition, there were battery exhibits by the Chloride Electrical Storage Co., Ltd., the Tudor Accumulator Co., Ltd., the Young Accumulator Co. (1929), Ltd., and the D.P. Battery Co., Ltd.

Prior to the opening of the exhibition a luncheon was held at the Midland Hotel, Manchester, attended by the electrical engineers of supply authorities and representatives of electrical manufacturers, distributors and important users of electric vehicles.

Col. G. D. Ozanne (Wingrove & Rogers, Ltd.), who presided, spoke of the possibilities of electric traction in providing a big power load. If the present campaign was as successful as others had been, it would probably be extended to other parts of the country. Mr. G. T. Allcock (deputy borough electrical engineer, St. Helens) stated that battery vehicles represented an off-peak load and each vehicle required about 6,000 kWh per annum. If there were now about 600 vehicles running about the streets of Manchester and district they accounted for the consumption of about 3½ million kWh per annum, nearly all taken at night time.

Other speeches were made by Major A. E. Trundle and Mr. H. E. Annett (Bolton).

Trade Mark Protection

THE Trade Marks Act passed last year cleared up a number of obscurities in the earlier Acts dealing with the subject and introduced reclassification which reduced the number of classes from fifty to thirty-four. But every Act provides loopholes and the possibility of different interpretations, and this is no exception to the rule. Consequently there is justification for such a work as "Trade Marks and Their Protection under the Trade Marks Act, 1938," by Reginald Haddan, recently published by Sir Isaac Pitman & Sons (price 5s. net), although there are already some good works on the general subject of trade marks. The author naturally traverses some of the ground covered by these earlier books but does it in the light of the later legislation and elucidates and interprets a number of points. He shows, for instance, how far registration goes, stating that it is not intended that any trader should unnecessarily "appropriate" the whole class in which his mark is registered. On the other hand it is a provision of the 1938 Act that "defensive" marks may be registered in respect of goods other than those concerned to prevent such use as would indicate a trade connection between the registering concern and other parties. Another feature of the new Act is a provision that a trade mark can now be assigned with or without the goodwill of a business; formerly a mark was inseparable from goodwill.

The author details the procedure for the registration of a trade mark and deals with litigation and with protection in overseas countries. The book can be recommended as a useful work of reference.

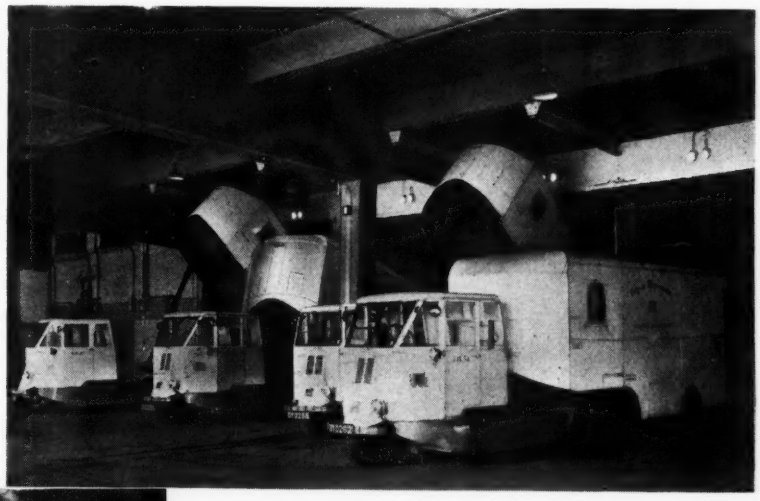
A Modern Cleansing Depôt

Conveying, dust extraction and electric vehicle battery charging equipment at the Westminster City Council's new depôt

EVERY day the Westminster City Council's public cleansing service, which carries out the collection and disposal of refuse and also the cleansing of the streets, handles between 300 and 400 tons of refuse. To provide a concentration point for this a new central depôt costing nearly £250,000 and covering an area of about 60,000 sq. ft. has just been erected between Gatliff Road, off Ebury Bridge Road, and Grosvenor Dock.

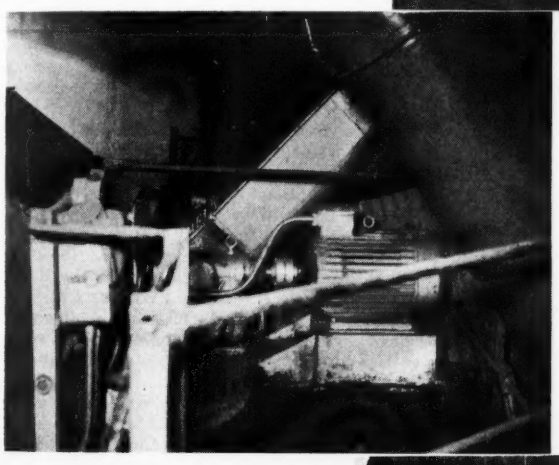
Facilities for dealing rapidly and efficiently with the entry, exit and maintenance of the refuse collection vehicles have been the primary consideration in designing the building. Laden vehicles entering over one of the two weighbridges proceed to the refuse disposal space, which occupies most of the ground floor, and then back up to the refuse elevators which transfer their loads to waiting barges.

The elevator plant, consisting of eight conveyors arranged in two units, will load two barges simultaneously. Each of the



Some of the fleet of twenty-three electric mechanical horses tipping refuse on to the conveyors

conveyors, which are constructed of steel plates, is driven through reduction gears by a 10-HP B.T.H. motor, the speed of travel being regulated between 10 and 15 ft. per minute according to the nature of the refuse and seasonal requirements. A receiving hopper of special design ensures the positive gravitation of the refuse on to the conveyor and the refuse is discharged into the centre of the barge, where it is levelled off by the Council's employees. Pilot lights are provided to indicate to the drivers which conveyors are in operation, so as to enable the minimum number of conveyors to be working during the slacker periods.



Situated immediately over the refuse handling plant and the barge

Filter hoppers with a 35-HP B.T.H. motor driving one of the dust-extraction fans in the background

berths is a dust extraction plant (Newton Collins) consisting of four large centrifugal fans which are capable of moving nearly 400 tons of air per hour. To drive the two fans over the conveyors two 35-HP, 970-RPM B.T.H. motors are employed, similar 55-HP units operating each of the fans over the barges. Steel suction ducts are fitted over the eight refuse receiving hoppers and these are operated by two of the fans, while the other two fans extract from six points in each barge housing. B.T.H. automatic controllers give both remote and local control of the dust extraction plant and in the receiving bay the "stop" switch is delayed three minutes so as to give any refuse still on the conveyors after a load has been tipped plenty of time to be carried away into the barges. In case of emergency all the dust extraction plant can be immediately stopped by a conveniently placed master switch operating across two phases of the motors.

The dust-laden air so collected is discharged into special textile filters where it is cleaned before passing into the atmosphere, and fresh air is induced through an intake in the outer wall facing the dock. The recovered dust is deposited into two filter hoppers with a total storage capacity of 18 tons, where it is bagged in special paper sacks which are then sealed and dropped down inclined chutes into the barges.

To confine the dust during the loading of the barges two barge berths have been provided, one for each battery of refuse conveyors. These are enclosed on one side by a timber piled screen driven into the bed of the dock and on the other by the building itself and are covered with a structure which is cantilevered some 40 ft. over the dock and houses the dust extraction plant. The tunnel so formed can be closed at each end and divided in the middle by three 28-ft. wide electrically operated counter-balanced dead-drop portcullis doors, which seal at the bottom in the water. These doors are operated by 8-HP B.T.H. motors provided with trip gear. An electric capstan (Stothert & Pitt) driven by a 3-HP motor draws the barges in and out of their berths.

Each of the conveyors is driven through reduction gears by a 10-HP B.T.H. motor

After the refuse collection vehicles have been emptied they draw away to the bays on the west side of the disposal space where they are washed by means of two machines incorporating Southwell pumps driven by 3-BHP Lancashire Dynamo motors. Nine nozzle outlets are provided and the arrangements are such that if the demands on one washer are too great to enable it to supply water at the required pressure of about 300 lb. per sq. in. the other starts up automatically.

After cleaning the vehicles ascend to the first floor garage *via* a ramp or, alternatively, return to duty. On reaching the first floor

they proceed to their parking places, the electric vehicles at one end and the petrol vehicles at the other. About 50 per cent. of the house-to-house refuse collection is now carried out by the electric vehicles, which have been adopted particularly for their quietness of running.

The fleet of vehicles now owned by the Council includes twenty-three Electricars—Scammell mechanical horse units, employed in conjunction with thirty-seven collection bodies, the latter being provided with self-emptying mechanism operated from the vehicle batteries. For charging, a special bay of the depôt has been equipped with twenty-six Nevelin mercury arc rectifier units—twenty-four rated at 80 A and two at 40 A. The smaller rectifiers are required for two electrically operated gully cleansing trailers. Until two years ago gully cleansing was done almost entirely by manual labour and, since the work has to be carried out at night-time, the question of noise, which was the predominant factor, held up mechanisation for a number of years. These trailers have, however, now been designed specially for the purpose and at little extra cost enable cleansing to be undertaken not only more efficiently but more frequently and with less noise.

Charging of the vehicle batteries is carried out by means of Nevelin mercury-arc rectifier sets [*Elec. Rev. photo.*

For general purpose work there is also a light 15-cwt. van (Electricars) for which a Westinghouse metal rectifier is installed. A similar 30-cwt. vehicle is on order.

In addition to the battery charging station, the first floor is equipped to furnish all the facilities of a garage service station both for the petrol and electric vehicles. Separate carpenters', metalworkers' and fitters' shops are provided and the equipment installed, which is all electrically operated, includes a Paisley band saw (3-HP, 735-RPM motor), a Dominion multiple woodworking machine (7½-HP, 1,500-RPM Brook reversing motor), a "Thor" portable welder, two lathes (driven respectively by 4-HP, 1,120-RPM and 1-HP, 1,000-RPM Brook motors), two Beacon and B.T.H. grinders (5-HP, 960-RPM, and ½-HP, 2,850-RPM motors), two Stedall Dowding drilling machines (1½-HP, 1,400-RPM and ¾-HP, 1,400-RPM Lancashire Dynamo motors), a hacksaw machine (1½-HP, 1,440-RPM Lancashire Dynamo motor), a Rotax valve grinder, a cylinder grinder and a brake relining machine which is fitted with a 1-HP, 1,430-RPM Crompton Parkinson motor for driving the emery wheel and a similar ½-HP, 2,850-RPM unit for the exhausting fan.

To provide compressed air for the lifting ramps, forges, paint spraying, tyres, &c., there are two Ingersoll Rand "Skyhi" compressors driven by 7½-HP, 1,450-RPM B.T.H. motors: Igranic control gear gives both automatic and manual starting. A further portable compressor (B.E.N.) is available for tyres, &c. Brake testing is carried out on a machine incorporating two 1½-HP, 1,450-RPM Crompton Parkinson motors, while the batteries of the petrol vehicles are charged from a 100-A, 15-V Crypton set incorporating a 750-W motor-generator. Punctures of inner tubes are repaired on a Steiner electric vulcanising machine and used motor oil can be given a fresh lease of life by being passed through a Streamline filtering plant. Each of the four paint shops is provided with an exhaust fan.

The cold spell at Christmas proved the value of the facilities provided for the rapid loading of lorries with salt for use on roads. At the large salt store on the ground floor four lorries at a time can be loaded by means of 15-in. belt conveyors each driven by a 1-HP Lancashire Dynamo motor.

Underneath this salt store is a coke store which also has a conveyor, in this case a mobile unit running on rails (1-HP, 940-RPM Lancashire Dynamo motor) enabling the coke to be distributed where required. From here the coke is gravity fed into four thermostatically controlled boilers beneath. The three largest of these are used for providing low pressure hot water for the heating system, which incorporates unit fan heaters blowing hot air into the larger spaces, with radiators heating the smaller rooms. Hot water is provided from calorifiers—in the winter months indirectly from the heating boilers and during the summer from the fourth, smaller boiler. Circulation of the water is effected by means of Fredk. A. Pullen & Co.'s pumps arranged in duplicate and driven by 3-HP Crompton Parkinson motors with Brookhirst starters.

For the employees there are a canteen, a washhouse with a Crypton face and hand dryer, and clothes drying rooms fitted with exhaust fans (1-HP B.T.H. motors) connected with a trunking system. Several Vent-Axia exhaust fans are used also in offices, &c. Gent's electric clocks have been installed throughout the building and much of the lighting equipment was supplied by Benjamin Electric Co., Ltd. A lift installed was made by Waygood-Otis, Ltd.

A three-phase AC supply is taken from the Central London Electricity, Ltd., at 230/400 V. Two walls of the intake room are occupied by the 200-V and 400-V power and the dust extraction plant panels, separate Statter circuit-breakers controlling each of these three services.

On another wall is the lighting panel together with the battery charging plant circuit-breaker. Energy for battery charging can be taken at any time during the summer but in the winter a time switch restricts the periods of use to 12.30-3.30 p.m. and to 6 p.m. to 9 a.m. Phase voltage checkers are provided on the 230-V power and lighting circuits. "Apex" metal-clad switch and fuse gear is employed throughout and efficient earthing is ensured by utilising 1-in. copper strip bonded to earth on all apparatus in the room. The electrical contractors were Pinching & Walton, Ltd.

Architecturally as well as in connection with its equipment the building is of particular electrical interest since it is claimed to have the largest electrically welded roof so far erected in this country. The roof trusses are welded two-hinged portals at 34 ft. 6 in. centres which spring from the first floor and span 92 ft. 8 in. right across the building, the rise to the crown being 31 ft. The largest span is about 110 ft. They are in the form of H-sections built up in plates, the weld varying in depth from 18 in. to 3 ft. and the flanges 12 in. wide being stiffened at intervals. Each truss was assembled in the shop in three pieces so that only two site welds had to be made before erection. Dorman Long & Co., Ltd., who were responsible for this welding work, utilised Quasi-Arc equipment. The building was designed by Mr. G. Grey Wornum, F.R.I.B.A., in collaboration with the City Council's Director of Public Cleansing, Mr. H. Ardern, M.B.E., A.M.I.Mech.E., and Messrs. R. T. James & Partners, who were responsible for the design of the structural steelwork. The main building contractors were Messrs. W. & C. French, Ltd.

Rubber Cables and Cords

BRITISH Standard Specification No. 7 has undergone a revision of a more far-reaching nature than on any previous occasion. The new edition deals only with rubber-insulated cables and flexible cords, paper-insulated cables being dealt with in a separate specification (B.S.480). The scope has been considerably enlarged by the inclusion of particulars of the various types of cables and flexible cords which are recognised as standard, together with details of their construction and protective coverings. Special provision is made for flexible cords for particular purposes (*e.g.*, vacuum cleaners, unkinkable domestic cords, &c.) and the section on tests has been considerably revised. Spark testing is now recognised as an alternative to the ordinary voltage tests. Insulation resistance figures are also standardised. The specification is, in fact, so different from its predecessors that a brief comparison is not possible. Copies of this B.S. (No. 7-1939) may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 3s. 8d., post free.

E.D.A. Annual Luncheon

H.R.H. the Duke of Kent is to be the chief guest of honour at the annual luncheon of the British Development Association at Grosvenor House, Park Lane, W., on March 17th. He will propose the single toast to which the Earl of Lytton, president of the Association, will reply. A record attendance is expected—hence the move to Grosvenor House.

Organisations of the Industry—VII

Electric Lamp Manufacturers' Association

By C. W. Sully, Director

HOW many have realised, when reading this series of articles on associations connected with the electrical industry, that the commercial birth of these organisations was due to the electric lamp? No article in the electrical industry has been so nursed by patents as the electric lamp and its utility to-day is due mainly to the fostering effect of H.M. Patent Office over a period of fifty-nine years, *plus* the business association of the individual patentees concerned.

The first to stand the test of commercial use were the carbon filament lamps for which patents were obtained in 1880 by J. H. Swan and T. A. Edison. Within three years these men decided to pool their interests which gave birth to our electricity supply industry. From that date to this new patents have followed older ones through the metal-filament, the gas-filled, the coiled-coil and electric discharge lamp, each improving the economic advantages of artificial lighting, until to-day we are able to obtain efficiently globes of light of the pearl and opal types, or still more efficiently, of the electric discharge type.

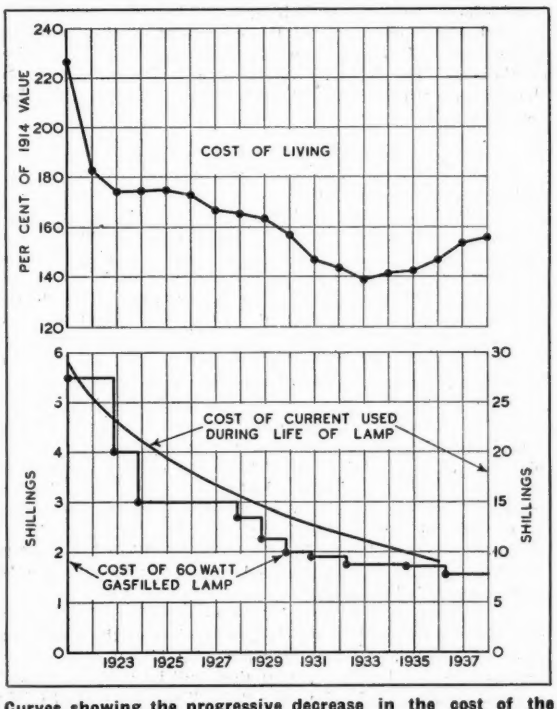
The electric lamp can be said to have laid the foundation of the modern electrical industry. This article shows how the organisation of the lamp manufacturers has developed with the progress made in the lamp-making art.

The Electric Lamp Manufacturers' Association of Great Britain, Ltd., was formed in 1919 as a public company trading without profit. It represented the growth of associations of patentees in the electric lamp industry and embodied two of its predecessors, *i.e.*, the British Carbon Lamp Association, formed in 1905, and the Tungsten Lamp Association, formed in 1911. In 1933 its members formed a new association, which complies with the legal requirements of a trade union, and is known as "E.L.M.A."

Its objects are to formulate, regulate and secure uniformity of practice in the manufacture, sale and purchase of electric lamps within the British Isles, in such a manner as to benefit both the trade and the public by the adoption of standard conditions of product and sale.

Quality of Product

One of the aims of the Association is quality of product. Manufacturing experience is interchanged between all members, not only as regards the lamps themselves, but concerning the processes and machinery for their production. A Technical Committee meets frequently so that all are familiar with the most up-to-date processes. They also have full interchange of technical development with all the more important factories abroad.

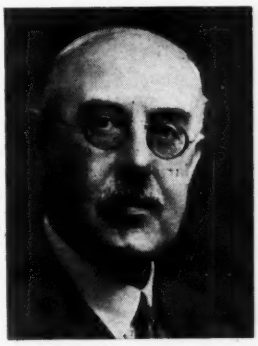


Curves showing the progressive decrease in the cost of the 60-W lamp and in the amount of current consumed since 1921. For comparative purposes the trend of the cost of living during the period is also shown

The quality of an electric lamp cannot be judged by eye, nor can it be gauged by superficially testing for efficiency. The inherent quality of lamps can only be judged after a cross section of the product of a factory has been tested to destruction for life and efficiency throughout life. For this purpose manufacturers of E.L.M.A. brands of lamps keep a careful check on their own product, from the raw material of its constituent parts to the finished lamp by tests at every stage, and in addition E.L.M.A. gathers samples of lamps from each factory and which are tested in an independent laboratory. It follows that in regard to lamps the user must rely to a large extent on the good faith of manufacturers.

The members of E.L.M.A. have always adopted a fixed price policy for the sale of their lamps to the public; a customer in John O'Groats or Land's End pays the same for his lamps as a similar customer next door to an E.L.M.A. factory.

The details of this policy are controlled by a committee consisting of the commercial representatives of the member firms which lays down terms of sale, and classifies both the customers and the very large variety of lamps manufactured. The latter are divided into such groups as general service lamps, automobile lamps, miners' handlamps, &c., the former into users, trade users, retailers, factors or wholesale distributors.



[*R. Hamer, London*

Mr. C. W. Sully, the Director of E.L.M.A.

The demand for electric lamps is seasonal and so the practice of the Association has always been to base the terms on the customer's requirements over a full year rather than the size of each individual order. In the past this has been done by rebates when earned resulting in improved terms on invoices. Last year that practice was replaced by one which ensures a fixed invoice price from all suppliers and a quantity rebate to be claimed from the Association when earned.

Relations with Other Bodies

The various Committees are under the direct control of the Association's governing body or Council which, as an important section of the electrical industry, wholeheartedly supports organised electrical trading and development. For this reason it continually seeks the advice of other trade associations within the industry such as the E.W.F., the E.C.A., N.F.I., I.M.E.A., I.A.E.P.C., &c., upon general service lamps; the M.F.A., S.M.M. & T., &c., in connection with automobile lamps, and the M.E.L.M.A. with regard to miners' hand-lamp bulbs.

Consistent with the primary requirements of maintaining a high standard of product, E.L.M.A. has maintained reasonable prices to the public with a satisfactory margin for the constituent members of its distributing organisation. The accompanying diagrams indicate the drop in the price of the 60-W lamp over a period of years and compares that fall with the corresponding reduction in the cost of current consumed by a 60-W lamp over its life of 1,000 hours, also the variations in the cost of living during the same period. *It will be noted that reductions in list prices have kept pace with the cheapening of electricity and if linked with improvements in lamp efficiency, the efforts of E.L.M.A. members surpass those so far made by all other sections of the industry in cheapening the cost of light.*

The Government encourages the grouping of manufacturers into associations, since, by so doing, any given industry is in a better position to play its part in supplying the markets of the world. Mr. Oliver Stanley in advocating the utility of the B.E.A.M.A. recently warned manufacturers that they were not competing to-day firm against firm but firm against

industry or even firm against country, and asked what individual firm, however competent, however resourceful, however efficient, could hope successfully to do that.

Research and Co-operation

Only a well-balanced trading policy makes it possible for the members of E.L.M.A. to play such an important part in the development of the industry. Over £200,000 a year is being spent on research work. This work has quite recently brought about the introduction of the pearl lamp which has done so much to minimise glare, the coiled-coil lamp which gives the public extra light worth at least £2½ million per annum to them, and, still more recently, the electric-discharge lamp which is rapidly enabling the electrical industry to improve the street lighting throughout the country. The end is not yet, since research on fluorescence by ultra-violet radiation promises not only to increase light efficiency but offers unlimited scope in colour modulation.

The Lighting Service Bureau

In 1924 the E.L.M.A. set up its Lighting Service Bureau as a centre for lighting demonstrations, propaganda and educational work. It realised that there can be little use in providing an electric lamp of uniform quality and unrivalled excellence unless means are available to investigate its uses in all human activities, and to educate, prompt, and direct both the trade and the public to an increased appreciation of the possibilities of "more and better lighting." Lighting campaigns, design courses, liaison with medical and architectural professions, preparation of lighting codes, conduct of an editorial Press bureau and submission of data to Government Departments all form part of the Bureau's activities.

The Bureau has become the recognised centre for lighting development and takes part in many outside movements. Co-operation is particularly active with the following bodies:—The Illuminating Engineering Society, the National Illumination Committee, the Association of Public Lighting Engineers, the British Electrical Development Association, the Electrical Association for Women, and the British Standards Institution.

To sum up, the manufacturers of lamps carrying E.L.M.A. brands have visualised their responsibilities to the electrical industry and the British public on the broadest and most progressive lines. They have combined their interests and activities, in the first place, to produce lamps of uniform excellence and dependability and, in the second place, to educate the public through the trade in the proper use of the product which they have been at such pains to perfect. The service thus rendered to the public is invaluable. E.L.M.A. manufacturers have not been content to produce a good article and leave it at that. They have said, in effect, "Here is an article that is as near perfection as human ingenuity can attain; permit us at the same time to tell you how to use it—to tell you how the best brains in the world are using it—so that you may extract the utmost benefit from its use."

Some of those engaged in the industry to-day hold the view that the electric lamp is an article hardly worthy of their attention without reflecting on the fact that its development has been the root source of the development of their industry and has enabled electric lighting to retain its position as the chief handmaiden of the industry. The whole E.L.M.A. scheme of things represents the productive expenditure of money on the most intelligent lines to achieve a great and beneficial end; it is planned to eliminate wasted effort and to secure a fair return on its capital commitments.

Giving a Testimonial. By Employer

How much (or little) should be said?

THE giving of testimonials is a common duty in any large undertaking and the chief recognises that his staff have a right to better themselves as he did in his day. Yet the whole problem of the testimonial is involved in uncertainty and difficulty and a discussion on it may be helpful.

What is a chief to say about a man who is good in some ways and defective in others, as most people are? Is he to stress the good points, merely refer to them, or tell the bad ones also? It is a delicate subject but it requires elucidation. There is much to be said for the usual custom of mentioning the good points and omitting the defects, for how is a chief to know the defects well enough to deal with them adequately.

A man may give the impression of being unwilling to exert himself and generally of being unenergetic but this may simply be that he does not get on with the head of his department. He may have the feeling that it is no use his putting himself about to get things done as the man above him will sit on him every time. Possibly the trouble is merely incompatibility of temperament but the effect is real enough. The man with an active mind who is built for responsibility is most liable to this trouble and he may be a different person when he has opportunities to use his abilities.

There was once a technical designer with one of the big firms who took up a post with a firm which was developing a new department and a member of his old firm told me that they were not sorry to get rid of him, he was lethargic and not of great ability and they felt that his new firm would not be a serious competitor with him in charge. He certainly did not look energetic but he was a brilliant success in his new position and his firm has every reason to be satisfied with the results which it has obtained. Such instances are common and the industry is full of good men who did not seem to promise much in their early days. One meets older men who ask "Why him? I never thought that he would do anything when he was with us; I had to explain the simplest things to him and he seemed too slow in the uptake to be any good in a position of responsibility."

Square Pegs

If a man is not doing too well in his present job it may pay him to try somewhere else. It may happen that he will be far more at home on the business side than on technical work or *vice versa*, or the mere change of environment may work wonders. From this point of view the testimonial should not dwell on the negative side of an employé too much, although it may be necessary to show restraint in the letter which will convey to the prospective employer that there is a negative side. It is always possible for him to make a private inquiry as to the man's character, and to bear in mind that the chief is debarred by the law of libel from saying too much. The statement that Jones has had experience in certain work without much reference to his ability for doing it conveys a good deal to the man who can read between the lines.

Testimonials may prove awkward in a municipal undertaking when a higher position becomes vacant and the lower men expect to rise up a step. Here are three staff men X, Y and Z. X is a good sort with first-class technical ability but he is easy going, he feels that there is plenty of time to-morrow and that it is better to take a risk than to work overtime. Y is a pusher and gets work done but is weak technically and requires careful instruction before he deals with anything difficult. Z has technical knowledge and can get work done but he has a bad way with him, quarrels with everyone and has a habit of going round the councillors with complaints and stories. If there is an attack at a committee meeting on the chief for delay in repairing a fault or for working the men overtime or for other reasons the information has come from Z.

Other Uses for References

The chief does not recommend the promotion of these men and tells the committee that he does not consider them suitable for higher positions. Then the testimonials are produced. "How is it that you do not think these men suitable for promotion in view of these testimonials? You say nothing about X lacking energy or that Y has not technical knowledge enough for a higher position or that Z quarrels with the others. On these testimonials these men are suitable for promotion and ought to be advanced to higher positions."

An even more difficult problem has arisen in the courts. A man gets a testimonial from his chief who is kind enough to set forth his best points, but subsequently he has to discharge him. There follows an action in the courts for wrongful dismissal and the testimonial is used with deadly effect by the plaintiff's counsel. "You say," he thunders, "that my client was incompetent and that you had to discharge him as he was not carrying out his duties to your reasonable satisfaction, but what did you say in this letter, signed by yourself?" Of course, the lawyer knows how matters stand but he is out to win his case and the chief soon has reason to regret that he ever tried to help the man.

The problem of testimonials is very complicated and more care will be required in the future in view of the possibility of court cases. Some firms get out of it by refusing to give testimonials and by stating that they will be ready to answer inquiries but this is hard on the staff. Those concerned might well take legal advice as to how to frame testimonials which will not involve them in legal actions, or as to means to protect themselves from penalties arising from them. One might, of course, play for safety by making all testimonials so colourless that they could not serve in court cases, but some better way should be possible.

Meetings and Discussions

The important rôle played by the chemist in a modern power station was stressed in a paper read by two members of the London Power Company's staff before the Institution of Chemical Engineers last week. Proceedings at the Institution of Electrical Engineers have included a paper on applications of the "Metadyne" principle to electric traction; a discussion on expert evidence at an informal meeting; and a description of the methods of recording sound on film given at a meeting of the London Students' Section.

Power Station Chemistry

SOME conrtbutions of chemistry and chemical engineering to steam generation were described in a paper by Messrs. G. W. Hewson and R. Ll. Rees (London Power Co.) which was read before the INSTITUTION OF CHEMICAL ENGINEERS in London on February 17th.

The paper commenced with the observation that in the larger power stations the magnitude of the operations converted small fractional improvements in efficiency and maintenance into considerable annual savings. Some of the fairly recent developments dealt with were not yet applicable to the smaller plant in which case the returns would not justify the cost of adopting them.

Some of the principles upon which the authors based their reasoning were adaptable to other purposes. An example was the theory of coal sampling, which had been worked out in considerable detail with a great deal of success, and was capable of modification to suit the sampling of other materials; it might also throw useful light upon the process of mixing granular solids.

The authors briefly described a new theory of sampling and used it to obtain a rough but illuminating estimate of the kind of accuracy which could be expected from a careful determination of the calorific value of a consignment of coal. Their theory was claimed to be a contribution to chemistry, since it was founded upon the results of a large number of chemical analyses which had been gathered into a coherent whole by means of the theory of errors.

Any device capable of providing a continuous record of the moisture contained in coal passing to the automatic weighers would be of great value if the inevitable errors were small and non-cumulative. Two physical principles were promising in this direction: one of them made use of the high dielectric constant of water, the instrument being, in fact, an electric condenser, the capacity of which was continuously recorded. The second principle consisted in employing the electrical conductivity of the water to damp high-frequency oscillations in a neighbouring circuit, the record being controlled by the amount of damping. This method had already been applied to the measurement of moisture in grain. A reliable instrument would exchange the uncertainty which now resided in the moisture figure for a more easily measurable instrumental error. There would be no sampling error if the whole of the coal stream could be passed through the instrument.

Unburnt Gases

To show that large stoker-fired boilers did not necessarily lack flexibility the authors mentioned boilers that were sometimes brought from the fully banked state to a steady load of 250,000 lb. per hour in less than fifteen minutes. The burning of coal efficiently on large mechanical stokers was discussed in general terms and illustrated with the results of boiler trials. More detailed attention was given to the various sources of loss of heat, especially that of unburnt gases from the furnace, which was particularly important when boiler efficiencies in excess of 90 per cent. were aimed at. It was possible to assess this loss with some precision and the means of doing so were described, but not the analytical technique.

The authors considered present knowledge of boiler and water treatment too confusing for ordinary discussion. Instead they summarised the subject in a table containing many references to the original literature. They emphasised from their own experience the very real advantages of pure feed water.

Finally, those methods of removing oxides of sulphur from flue gases that had at least reached the stage of pilot plant operation were reviewed, with special reference to the pioneer installation at Battersea and how it differed from the Fulham plant. It was pointed out that in the U.S.S.R. the problem was being tackled from a different angle. The capacity of the Moscow river was not considered great enough for the adoption of the Battersea system of gas-washing, and the very high rates of pumping required by most of the cyclical methods were thought to be a grave disadvantage.

The Russian experimenters had turned their attention to oxidation of sulphur dioxide in the high-frequency discharge and the high-voltage arc. The latter process was hardly practicable because of the difficulty of passing flue gases in bulk through an electric arc, and because of the formation of oxides of nitrogen which would be as much a nuisance as oxides of sulphur. A small industrial plant had been built for oxidation in the high-frequency discharge. It was claimed that the sulphur dioxide could be oxidised completely, and that strong sulphuric acid could be obtained; but there was no hint of the manner of separating the sulphuric acid from the gases.

The Battersea and Fulham processes could not yield profitable recovery products in the present state of knowledge, but they were both readily adaptable. Gas-washing results at Battersea during the past five years were summarised to show how closely prediction had been fulfilled. The average costs of operation per ton of coal burned were 3.77d.; pumping cost, 1.25d., and maintenance, 5.94d., but a better method of supporting the mild steel scrubbers had now been adopted. Efficient and more consistent results were more easily obtained when one tower was in service than with both working in parallel. Uneven distribution of gas was not entirely responsible, the greater part of the difference being undoubtedly real and due to the mode of operation in parallel. Improvement should result from changes being made to the design of the plant for the new section of the station.

An electrostatic precipitator had been installed in one of the towers to see if it would diminish the visible plume of condensed moisture that passed from the chimney, and to note its effect upon the trace—too small to measure accurately—of very finely divided mineral matter that escaped from the washer.

Boiler-house Chemists "Metadyne" Traction Control Expert Witnesses

The "Metadyne"

APPLICATIONS of the "Metadyne" principle to electric traction, including the London Underground railways, were dealt with in a paper by Messrs. G. H. Fletcher and A. Tustin (Metropolitan-Vickers Electrical Co., Ltd.) which was read at the INSTITUTION OF ELECTRICAL ENGINEERS in London on February 23rd.

The "Metadyne" was invented and developed in a number of forms by Prof. J. M. Pestarini, now of Turin University, the authors stated. The term covered various forms of dynamo in which extra sets of brush arms were placed between those that would be present in an ordinary dynamo. To avoid bad commutation at these additional brushes the main poles were subdivided, and additional interpoles might be fitted in the spaces so provided. Owing to the number of polar projections being increased in this way, and therefore not being the same as the number of poles of the armature winding, it was convenient in order to avoid confusion to speak not of "pairs of poles," but of a one-cycle machine as having an armature with one pair of poles, a two-cycle machine with two pairs of poles, and so on, the term "cycle" referring to each of the repetitions of identical electrical parts around the periphery.

Metadynes derived their special properties from the fact that the armature reaction played an essential part in the operation of the machine, and in most cases the MMF's of the armature provided the principal excitations.

The first section of the paper explained the special properties of such machines, especially as sources and users of constant current, or in obtaining special relationships between the current supplied to a load and the voltage across it. The equations for the calculation of currents and fluxes were given, and the functions of various stator windings explained.

The second and longer part of the paper described in detail equipments which had been installed, with schematic diagrams of connections. In most cases the parallel (constant voltage) system was satisfactory, but for many special applications either constant or controlled current systems would be better.

The Metadyne in the form either of a "DC transformer" or mechanically driven generator owed its usefulness chiefly to the ease with which it enabled the current supplied to depend in a predetermined way on the back EMF of the load supplied. In its simplest form it was a source of constant current, automatically giving just sufficient EMF to overcome the varying back-EMF of the load and maintain the current constant. It was extremely simple, however, to

arrange the excitation so that the output current rose and fell as a predetermined function of the back EMF and thus of the speed of the motors supplied, according to the characteristic required. The maximum current was limited, even on short-circuit, and an ideal relationship of torque to speed was obtained according to the particular requirements. In such equipments the motor speed was chiefly controlled by the variation of the voltage applied to the motor terminals. Low motor speeds could therefore be obtained without increase in the flux of the motor, so that when a wide range of speed control was required the motors might be reduced in size. The torque might be maintained or varied smoothly without notching, and in braking the equipments were inherently regenerative down to standstill of the motor.

These features were of the greatest interest in electric traction, eliminating sudden changes in the rate of acceleration, and permitting the motors to convert the kinetic energy into electrical energy during braking, the Metadyne transforming the varying voltage of the motors to constant voltage of such a value as to permit the energy to be returned to the line.

The advantages of the scheme were high and smooth acceleration, reduced consumption of energy, reduction of brake-shoe wear, saving in maintenance of electrical equipment due to reduction of brake-shoe dust and increased life of wheel tyres. The disadvantages were greater weight and cost of equipment.

Metadyne control would appear to be even more suitable for shunting locomotives than for suburban electric railway service. For Diesel-electric locomotives Metadyne excitation could be used with great advantage, introducing a field-forcing action.

Expert Evidence

THE informal meeting of the INSTITUTION OF ELECTRICAL ENGINEERS that was held on February 6th was the first of a special series of three to take place jointly with the Civil and Mechanical Institutions.

Mr. J. H. Rider opened the discussion on "The Preparation and Giving of Expert Evidence." He said that a person who might be called upon to occupy the witness box or chair should know the case thoroughly and always speak the truth. If these two maxims were faithfully followed the witness, whatever the value of his evidence might be, would always be a match for any cross-examining counsel.

To know the case thoroughly the witness must be an engineer of experience, but this alone was not sufficient. He must be able to express himself clearly and concisely, be quick in grasping the meaning and import of any question, and be able to give his replies in such a way as to impress the tribunal with his accuracy and sincerity; he must show that he both knew and believed in his case. Over-confidence could lead a witness into many a trap when being cross-examined, and should always be avoided.

Film Sound Tracks

SOUND-ON-FILM recording was considered in relation to the photographic properties of the film in a paper by Mr. D. W. Boston which was presented to the London Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS on February 20th. The author explained how various kinds of distortion and background noise might be introduced and means of minimising them. Generally some form of mechanical light valve, incorporating ribbons moving in a magnetic field, was now employed for modulating a track-forming beam of light. Variable density recording might be distorted if the film were processed without strict proportionality between the recording light and the light transmitted through the sound track. This was not necessary for variable-area recording by deflecting a beam of light by means of an oscillograph so that the modulations took the form of variations in the width of the sound track. Provided the track was sharply defined, distortion would depend on the processing of the film. The line of light must be extremely thin, since it could not trace without distortion waves of length comparable with its thickness. Standard motion-picture film ran at 90 ft. per min., giving a wavelength of 0.002 in. for a note of 9,000 cycles per sec. To trace this without distortion, the line of light should not be more than 0.0005 in. thick.

It was very important that the waves traced should be sharply defined, since this factor set the limit to the recording of high frequencies. With a 0.5-mil slit the exposure time was only 1/36,000 sec. The oscillograph should therefore be given as large a mirror as possible consistent with a high resonant frequency, which should not be lower than 8,000 cycles per sec. for high-quality recording.

If the sound track of the reproducer was opaque there would be very little noise due to dirt, grain and scratches interrupting the light. The track could be kept black in the absence of modulation and opened just sufficiently to accommodate the peak value of the modulation by biasing the oscillograph with DC obtained by rectifying a portion of the signal. A recent development had been the use of two sound tracks in push-pull, thus enabling the effect of variations in the mean transmission to be balanced out.

Paper-making Machine Drives

A WELL-ILLUSTRATED paper descriptive of a modern paper-making machine was submitted by Mr. W. H. Orr (E. S. & A. Robinson, Ltd., Bristol) at the annual general meeting of the INSTITUTION OF MECHANICAL ENGINEERS in London on February 17th. Last year 24 million tons of paper was made, mostly of wood pulp, though a variety of other materials could be used. In the extreme case the installation of two machines for making newsprint might cost £1,500,000, which figure indicated the magnitude of the standing charges and the seriousness of any interruption of output; while depreciation and interest charges were high compared with other industries.

A paper-making machine and its auxiliaries consisted of many diverse units, each forming a link in a chain. The breakdown of any one item would stop the whole producing unit, which normally ran night and day for at least 132 hours each week. It was therefore imperative that each item should be as reliable as it could be made.

Electric driving had become almost standard practice, in most cases on a "speed matching" system. The principle was to match the speed of each individual section to that of a master section, any deviation causing a regulator to restore the relative speed of the defaulting section. Various means of doing this were described by the author, including the DC Harland drive with a motor generator or booster providing variable voltage for the directly coupled sectional motors. The speed range was obtained by a combination of voltage and shunt control on the sectional motors by means of electrical regulators. Drives operating with AC had also been extensively installed, the best example being based on the three-phase variable-speed commutator motor, such as the B.T.H. method.

Electric drives certainly permitted a better layout at the back end of the paper-making machine and were advantageous in view of the recent stricter legislation under the Factory Act. The limits within which it was claimed that such drives would control the speed of sections relative to the master section seemed to the author debatable; claims up to ±0.1 per cent. were made. Efficiencies of about 75 per cent. down to, say, three-quarters normal speed were claimed; also that it was possible to control the speed of the paper-making machine as a whole to within ±0.5 per cent. Speed ranges of 10 or 14 to 1 had been provided and maximum speeds up to 1,400 ft. per minute had been attained.

Electricity in Horticulture.—At a meeting of the Manchester and District Branch of the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS yesterday (Thursday) a lecture on "Electricity in Horticulture" was to be given by Mr. B. R. Vickers, of the Manchester Corporation Electricity Department. Among the subjects of the lecture were electric heating for greenhouses; the use of tubular and panel heaters, low-voltage strip heaters and air convectors; electric water-heaters and electrode boilers for large installations; combined coke-electric systems: soil heating cables; soil pasteurisation; liquid culture and plant irradiation; and wiring in the greenhouse and garden.

An interested group inspecting the spark tester included among the Cable Makers' Association's exhibits at the Birmingham Section of the B.I.F.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Early Experimental Telegraph "Cable"

In Part I, Vol. XX, of the *Journal* of the Institution of Electrical Engineers (1889) will be found a paper by P. V. Luke, C.I.E., on the "Early History of the Telegraph in India," in which particulars of the iron rod "cable," described and illustrated in your issue of February 17th, are given, and the following information, extracted from this paper, may be of interest to your readers:—

The "cable" formed part of a system 82 miles in length, partly overhead and partly underground, connecting Calcutta to Diamond Harbour, with branches, and an extension to Kidgeri on the further side of the Hughli. The same "cable" was apparently used in the original crossing of the river, but we are told that "it was not until copper wire insulated with gutta-percha was obtained from England that signalling across a river was made really practicable." The overhead portion of this Calcutta-Diamond Harbour line consisted for the most part of the same ⅜-in. iron rod as was used in the "cable," carried on bamboos, 200 to the mile, with teak or ironwood poles at intervals to give additional strength to the line.

Mr. Luke says: "Dr. O'Shaughnessy was evidently very proud of the line he had constructed, for in a report he says: 'The over-ground lines differ totally from those in use in America, England or any other country, in the following most important point—no wire is used. Instead of wire, I employ a thick iron rod, ⅜-in. diameter, weighing 1 ton to the mile, while elsewhere the heaviest wire is 1 cwt. to the mile.'"

Communication was maintained over this iron rod line from 1851 to 1856.

J. F. LAMB, M.I.E.E.

Cambridge, *February 20th.*

Jute-insulated Cables

I have read with great interest the article by Mr. Llewellyn B. Atkinson, setting out the development of underground cables and pointing out the various types of insulation that have been used since their inception. I am surprised, however, to find that no mention is made of jute-insulated cables, as these were in use for a very long period.

I happen to have been connected with the industry for some time, and I distinctly remember away back as far as 1890, that at least two of the companies engaged in making underground cable, supplied a very large amount of jute-insulated cables. I am therefore wondering why it is that this type was left out in such a complete review as the one given in your issue of February 10th.

J. SNOW HUDDLESTON.

Gidea Park, Essex, *February 18th.*

Square Deal for Contractors

We note with interest "Contractor's" letter in your issue of February 10th, as we have been up against similar conditions ourselves. In this case, the supply company approached the builder and asked if it could see our prices in order that it could quote lower. If the supply companies have all this money to lose or give away, why do they not reduce the price of current to the consumer and not to try to put their most useful ally out of business.

With regard to "Another Contractor's" letter in the ELECTRICAL REVIEW of February 17th, we are members of the E.C.A. and have found that conditions suggested by him do not exist in this area. We contractors, in an industry where the supply authorities have the monopoly, do not ask any favours of these authorities other than fair competition and use of the same weapons—assisted wiring, co-operation on mains extensions, &c.—as they have.

February 17th. YET ANOTHER CONTRACTOR.

Qualifying Plumber-jointers

I have been very interested in the correspondence which has recently been published in your columns on the above matter. During the past three years we have been experimenting with evening courses in cable jointing and have evolved a course which, judging by the enrolment of the students and the results, is quite successful.

Those engaged in industry in this district do realise the increasing importance of such a course and are giving us very valuable support both by sending students and by giving material and equipment. The training given has been limited to cables for pressures up to 11 kV. The methods of jointing cables for higher pressures appear to be very specialised, each authority adopting its own process, so that a general course in the jointing of cables for pressures greater than 11 kV has not been evolved.

One fact about the courses which perhaps has not been sufficiently recognised is that training in cable jointing would be most necessary if a national emergency did arise, in order to prepare the staff to undertake the rather extensive repairs which may be anticipated as necessary after air raids.

From the experience which we have gained with instruction in cable jointing, it seems most desirable that there should be some national system of certification as mentioned by Mr. Maskery, and I hope that his efforts in this direction will meet with success.

H. L. HASLEGRAVE,
Principal,
Municipal Technical School.

St. Helens, *February 15th.*

May I through the medium of your journal thank the many chief engineers, mains engineers, mains foremen and jointers who have written to me in reply to my question, "Is cable-jointing of sufficient importance to warrant a scheme of certification of jointers?" I shall be forwarding to each of them a copy of a syllabus of the work to be covered, a practical test which I have drawn up, and a specimen examination paper. I shall be pleased to have their opinions on these and any help towards getting the scheme into being.

Every letter which I have received emphasises the necessity of such a scheme, and many instances can be given of the trouble and expense which has been caused by men posing as jointers who have been found out as having no experience. They begin to learn when by bluff they have got jobs as jointers.

WILLIAM MASKERY.

Brighton, *February 18th.*

Radio in a Change-over

As you are aware, the electricity supply in Finchley has recently been converted from 250 V DC to 230 V AC. My wireless set is equipped with a DC HT eliminator and battery charging through a 40-W carbon lamp. I have now been provided by the electrical undertakers with a rectifier connected to the HT eliminator giving a maximum output of 20 milliamps. As I considered that I was entitled to an AC eliminator and trickle charger, I accepted the rectifier as a temporary measure under protest, and although I have pressed my claim for suitable apparatus I have been met with refusal from the electrical engineer.

I gather from the Electricity Commissioners' terms of consent to the proposed alteration that the undertaker is obliged to carry out the necessary alteration without inconveniencing the consumer, and in view of the fact that hitherto it has not been necessary for me to remove the accumulator from my set, and that I shall now be obliged to do so and pay for having it charged periodically, I am thereby considerably inconvenienced.

A friend of mine in the same district has been similarly affected and no doubt other consumers have equal grounds for complaint. I should therefore be glad to receive your readers' views on the matter.

A. B. BROWN, A.I.E.E.

Finchley, N.3, *February 17th.*

B.I.F.

Is it not a mistake that the name of the British Industries Fair should be so commonly abbreviated into B.I.F., letters which are meaningless to many of the overseas buyers whom the Fair is intended to attract?

There are already quite enough abbreviations to initials in the electrical and other industries to be a source of bewilderment to those not intimately acquainted with what they stand for. To use the letters B.I.F. to advertise the Fair to the public here and abroad seems to be to disregard one of the first considerations of good advertising, which is to leave no doubt in the mind of the public as to what the advertisement relates.

QUERIST.

February 17th.

Teaching Engineering

SHORT courses for teachers in technical colleges and schools will be held at New College, Oxford, from July 24th to August 3rd. The primary aims are to consider the most suitable methods of presentation of subjects taught in National Certificate and other engineering courses and to review recent advances in engineering science and practice. Lectures will be given in electrical engineering, mechanical engineering and mathematics. Applications must be made before March 31st to the Secretary, Board of Education, Whitehall, S.W.1.

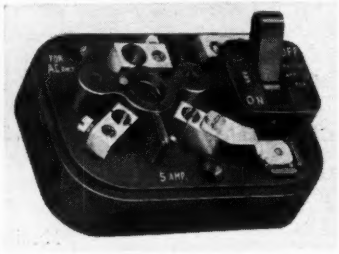
D

NEW ELECTRICAL PRODUCTS

A review of equipment recently marketed

Round-pin "Wylex" Sockets

A NEW line made by G. H. SCHOLES & CO., LTD., Wylex Works, Wythenshawe, Manchester, who specialise in the production of flat-pin plugs, is the 'Wylexion" switched socket outlet incorporating standard B.S.S. round pins.



Internal view of the "Wylexion" round-pin switched socket

The switch mechanism is the same as that in the "Wylex" flat-pin sockets and operates on the slow, short break principle, being specially designed for use on AC. The new range is available in both shuttered and non-shuttered forms and, as with the "Wylex" socket, forms a very compact and substantial unit.

The 5- and 15-A models are now in full production and the 2-A size will be available shortly, all being of the three-pin type and available in all types of flush and surface mounting.

A Scintillating Signal Lamp

A signalling lamp with a wide range of uses has been designed to give the maximum of visibility in a scintillating beam (not flashing) which is easily recognised and picked up in the neighbourhood of other lights. Its uses include tail lights for electric and steam trains, A.R.P. signals, traffic lights, street bollards, stationary buffers, docks and shipping.

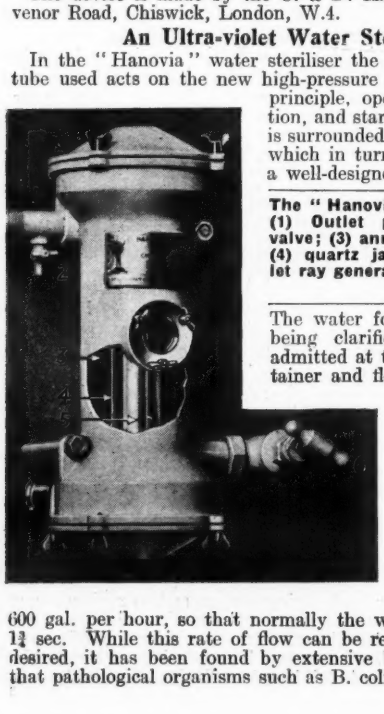
The C. & D. scintillating lamp

The lamp is fitted with two 15-W bulbs wired up in parallel to guard against a filament breakage, the whole electrical apparatus being mounted on a panel which can be drawn out clear of the lamp and free from loose wires. This panel is fitted with plugs which engage with sockets in the back of the lamp. The usual watertight cable socket is provided on the exterior of the lamp, and when necessary a s.p. switch.

The device is made by the C. & D. MANFG. Co., 3a, Grosvenor Road, Chiswick, London, W.4.

An Ultra-violet Water Steriliser

In the "Hanovia" water steriliser the quartz mercury arc tube used acts on the new high-pressure electronic discharge principle, operates in any position, and starts automatically. It is surrounded by a quartz jacket, which in turn forms the core of a well-designed metal container.



The "Hanovia" water steriliser. (1) Outlet pipe; (2) draw-off valve; (3) annular flow chamber; (4) quartz jacket; (5) ultra-violet ray generating tube; (6) inlet pipe

The water for treatment, after being clarified in a filter, is admitted at the base of the container and flows in an upward swirl around the annular flow chamber in a layer an inch thick. The chamber is 7 in. high and has a capacity of 2¼ pints.

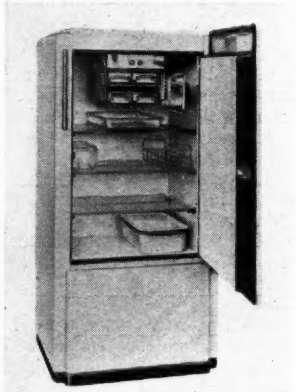
The steriliser is designed to give an output up to 600 gal. per hour, so that normally the water is exposed for 1¼ sec. While this rate of flow can be reduced to any point desired, it has been found by extensive bacteriological tests that pathological organisms such as B. coli, the typhoid bacillus, soil bacilli, &c., are destroyed even in heavy concentrations at this rate of flow. Other injurious organisms, such as the acidifiers and proteolytes which produce rancidity in butter, the sarcina, lactic and acetic-acid producing organisms detrimental in brewing, are likewise destroyed.

The steriliser is a compact unit and is rated at only 700 W on AC supplies. The makers are HANOVIA, LTD., Bath Road, Cippenham, Slough.

Two "Coldair" Refrigerators

Two new models (3- and 5-cu. ft.) are included in the "Coldair" programme just launched by the GENERAL ELECTRIC Co., LTD., Magnet House, Kingsway, London, W.C.2.

Special consideration has been given to floor space, the overall size of the smaller model being 45⅝ in. high by 21½ in. wide by 21$\frac{1}{16}$ in. deep. There are three shelves with a total area of 6.9 sq. ft., while the interior capacity is 3.23 cu. ft. One ice tray, making eighteen ice cubes in one batch, is supplied, but provision is made for an additional tray if required. The average consumption is $\frac{4}{5}$ kWh per day.



The "Coldair DMC51" refrigerator

The 5 cu. ft. size (DMC 51) provides ample storage accommodation for the average household and measures 52 in. high by 25½ in. wide by 22⅝ in. deep. The total area of the three shelves is 9.7 sq. ft., and the food storage capacity 5.8 cu. ft. Four ice trays are supplied making 72 ice cubes at a time.

Equipment comprises a defrosting tray, "Salador," medium size glass dish, egg basket, thermometer and automatic electric light. Average daily consumption is 1 kWh.

A Modern Fire

A fire of plain but pleasant appearance suitable for use in offices or in rooms decorated in modern style has been introduced by BULPITT & SONS, LTD., Swansea Works, Camden Street, Birmingham.

The fire is of sheet steel construction spot welded throughout, and the reflector is a seamless polished aluminium pressing. The reflector housing is pivoted and is adjustable in relation to the base and stand. One or two 1-kW elements are fitted—vertically in the small size and horizontally in the larger. Similar reflectors in chromium plated aluminium are also obtainable. The finish is hard glossy in enamel pastel shades.

The Bulpitt "Henley" fire

Screwed Cable Sockets

Cable sockets which, by means of a fine thread (40 to the inch), can be screwed on to the end of any size cable or flexible lead have been introduced to the English market from Holland by HAMMANS INDUSTRIES, LTD., Abford House, Wilton Road, London, S.W.1.

A screwed cable socket

The socket is conical in shape so that the pressure increases as the socket is screwed on to the cable end, with the result that ultimately the strands are locked together in a solid mass. Special pliers are provided and a drop of acid-free oil facilitates both screwing and unscrewing. The sockets are made suitable for 23/36 to 110/36 flex and 1/.044 to 91/.103 v.i.r. cable.

British Overseas Electrical Trade

In November last electrical machinery was exported to the value of £762,417, the highest for many years, and last month the total rose further to £827,626.

THE tendency for machinery manufactures to assume an increased proportion of Britain's overseas electrical trade noticed last year was still more apparent in the first month of this year, when exports of goods and apparatus were worth £1,094,879 and machinery £827,626, while in January, 1938, the respective amounts were £1,259,609 and £603,943.

The exceptional activity in electrical machinery exports last month was largely due to the requirements of British India,

TABLE I.—EXPORTS AND IMPORTS DURING JANUARY.

	Exports: Jan., 1939.	Exports: Inc. or dec. compared with Jan., 1938.	Imports. Jan., 1939.	Imports. Inc. or dec. compared with Jan., 1938.
Submarine telegraph and telephone cables	£17,839	− £44,744	*	—
Telegraph and telephone wires and cables (not submarine)	77,151	− 18,210	*	—
Other insulated wires and cables	259,680	− 61,305	£23,612	− £6,036
Radio receivers, not radiograms (excluding valves)	33,675	− 7,580	8,021	− 319
Radio transmitters (excluding valves)	30,650	+ 222	*	—
Radio valves	32,967	− 3,269	10,654	+ 1,606
Other radio parts and accessories	39,345	− 12,445	48,189	+ 4,801
Telegraph and telephone apparatus (other than radio)	284,629	+ 39,911	*	—
Electric carbons	*	—	2,779	− 5,274
Incandescent lamps	52,066	+ 688	8,139	− 3,311
Other lighting apparatus	51,121	+ 6,369	27,147	− 14,456
Primary batteries	12,666	+ 2,668	*	—
Accumulators‡	14,507	− 42,163	*	—
Electric cooking and heating apparatus (including industrial)	31,093	− 1,878	*	—
House service meters	13,567	− 127	*	—
Other electrical instruments (not telegraph or telephone)	21,326	+ 987	39,113	+ 12,920
Insulating materials not elsewhere specified	17,429	+ 3,425	*	—
Unenumerated electrical goods and apparatus	105,168	− 27,279	58,403	− 26,229
Electric generators up to 200 kW	34,892	+ 2,467	*	—
Electric generators over 200 kW	182,670	+ 99,849	*	—
Electric motors	181,623	+ 51,658	21,341†	− 11,482
Converting machinery	3,733	} − 18,164	*	—
Transformers for lighting, heating and power, including coils	92,044		*	—
Rectifiers for power-house use	8,714	+ 5,959	*	—
Starting and controlling gear for motors	53,850	+ 24,885	*	—
Switchgear and switchboards (not telegraph or telephone)	237,886	+ 57,002	*	—
Other electrical machinery	12,712	+ 368	13,120	− 6,428
Electric vacuum cleaners	19,502	− 341	9,663	− 2,941
Total	£1,922,505	+ £58,953	£270,181	− £57,149

* Not classified separately. † Not railway and tramway motors.
‡ Values not completely comparable.

to which plant worth £234,645 was sent compared with only £76,447 in the corresponding month of 1938. Also, the value of exports of this kind to foreign countries was double as much as in January last year. From Table I it is seen that there were large increases in exports of most types of machinery, with shipments of generating plant up by over £100,000. Particularly noteworthy is the steady upward trend in exports of switchgear, as is illustrated by the following values for the past six months: August, £148,318; September, £172,770; October, £192,247; November, £218,236; December, £235,555; and January, £237,886.

As the tabular statistics reveal, the total value of electrical exports last month was £1,922,505, an improvement of £58,953 (3 per cent.) compared with January, 1938. While machinery exports show a substantial improvement, those of goods and apparatus declined by £164,730. Actually, the position is not so unfavourable as the comparison implies because in January last year exports of this kind attained a peak value which has not since been reached, but the total nevertheless represents a further contraction following that of £26,878 in December. Cable exports remained the principal factor in this decrease, and those of wires and cables other than telegraphic and telephonic were less than in the previous month as well as January last year. An analysis of the principal destinations of these exports, with comparative values for January, 1938, in parentheses, is as follows:—

Rubber insulated wires and cables.—Australia, £33,815 (£40,699); British India, £23,998 (£18,348); South Africa, £13,364 (£17,423); New Zealand, £10,438 (£9,140); other British countries, £19,069 (£22,447); and foreign countries, £13,912 (£25,220).

Electric wires and cables, insulation other than rubber.—Australia, £35,651 (£41,373); South Africa, £31,304 (£50,484); British India, £26,837 (£32,962); other British countries, £35,954 (£31,670); and foreign countries, £15,338 (£31,219).

Another large item in the reduction in exports of goods and apparatus was the decrease from £56,670 to £14,507 in shipments of accumulators, but the Board of Trade returns indicate that the values given are not completely comparable. On the other side, exports of telegraph and telephone apparatus continued to be substantially in excess of a year ago, foreign markets providing most of the improvement as the following analysis reveals: Australia, £53,985 (£62,462); South Africa, £25,352 (£12,600); other British countries, £58,528 (£62,407); Argentina, £6,794 (£24,896); and other foreign countries, £139,970 (£79,353).

Turning to Table II, it is seen that the falling-off in exports of goods and apparatus was spread over most markets, the chief exception being the Soviet Union, which reappears among countries separately classified in the B.O.T. returns.

Last month's electrical imports were of a lower value than in any month since June, 1935, and show a reduction of £57,149 (17 per cent.) compared with a year ago. There was, however, a considerable increase in the value of electrical instruments brought into the country, and radio imports were also higher than in January last year.

Germany, now including Austria, displaced the United States from the position it has recently held as the principal supplier of electrical goods and apparatus to this country. The following were the chief countries of origin, with comparative values: Germany, £63,745 (£76,525); United States, £58,315 (£69,593); Netherlands, £38,262 (£46,866); Switzerland, £16,071 (£15,696); Belgium, £15,591 (£17,186); France, £12,717 (£5,599); other foreign countries, £13,567 (£25,005); and British countries, £7,789 (£5,885). Total, £226,057 (£262,355).

TABLE II.—BRITISH ELECTRICAL EXPORTS DURING JANUARY

Destination.	Goods and apparatus, Jan., 1939.	Inc. or dec. compared with Jan., 1938.	Electric generators, Jan., 1939.	Inc. or dec. compared with Jan., 1938.	Electric motors, Jan., 1939.	Inc. or dec. compared with Jan., 1938.	Other electrical machinery, Jan., 1939.†	Inc. or dec. compared with Jan., 1938.
Eire	£41,460	− £8,076	*	—	*	—	*	—
Channel Islands	19,099	+ 9,241	*	—	*	—	*	—
Palestine	6,947	− 4,048	*	—	*	—	*	—
British West Africa	16,929	+ 6,627	*	—	*	—	*	—
Union of South Africa	135,331	− 24,096	£43,944	+ £34,197	£19,545	− £14,947	£97,563	− £19,199
British India	117,913	− 22,797	87,630	+ 62,547	67,920	+ 47,164	79,095	+ 48,487
British Malaya	32,020	− 3,362	*	—	*	—	14,949	+ 3,873
Ceylon	9,455	− 776	*	—	*	—	*	—
Hong Kong	10,965	+ 186	*	—	*	—	*	—
Australia	185,179	− 28,770	12,025	− 23,120	12,945	− 1,349	66,259	+ 34,246
New Zealand	86,814	− 45,570	*	—	6,024	+ 2,597	28,356	+ 4,900
Canada	6,633	− 3,707	1,782	− 1,923	2,799	− 3,748	4,148	− 9,082
Other British Countries	49,913	− 4,643	24,063	+ 2,504	15,325	− 5,729	41,650	− 30,349
Soviet Union	93,535	+ 64,888	*	—	*	—	*	—
Sweden	9,608	− 2,423	*	—	*	—	*	—
Denmark	11,738	− 31,637	*	—	*	—	*	—
Netherlands	23,455	− 4,161	*	—	*	—	8,104	+ 3,940
Belgium	10,832	− 1,392	*	—	*	—	*	—
France	19,970	− 6,347	*	—	*	—	2,020	+ 257
Portugal	4,684	+ 574	*	—	*	—	*	—
Spain	2,315	− 1,154	*	—	*	—	*	—
Italy	7,678	− 3,024	*	—	*	—	*	—
Greece	12,521	+ 6,796	*	—	*	—	*	—
Rumania	22,803	+ 14,802	*	—	*	—	*	—
Egypt	5,778	− 11,268	*	—	*	—	1,808	+ 1,120
China	4,698	+ 1,795	*	—	*	—	3,337	+ 1,859
Brazil	3,747	− 6,002	*	—	*	—	*	—
Argentina	42,142	− 16,797	*	—	*	—	10,299	+ 6,394
Other Foreign Countries	100,717	− 39,589	48,118	+ 27,811	57,065	+ 27,670	51,351	+ 23,604
Total	£1,094,879	− £164,730	£217,562	+ £102,316	£181,623	+ £51,658	£408,939	+ £70,050

* Not classified separately. † Vacuum cleaners are included in Table I but not in Table II.

Management in the Supply Industry

By J. C. Petersen, A.C.I.S.

IN the early days of the electricity supply industry, engineers were necessary to plan, map out, and put into operation the projected schemes: engineering problems were then of the first importance and the pioneers were recruited from the ranks of civil, mechanical, marine, telephone, telegraph, and other branches of engineering. This without doubt was the origin of the designation of city or borough electrical engineer.

To-day the immutable law of progress has changed conditions; old methods must be abandoned and the commercial policy of the electricity supply industry must be accelerated and expanded. With the advent of the grid the great majority of undertakings are relieved from all further generating plant extensions and all the multitudinous duties connected with generation and they are now simply distributing centres. The prime object of these centres is the disposal of the commodity which demands determination in many directions to ensure increasing sales and consequently the acceleration of the revenue earning capacity.

It must not be overlooked that the electricity supply industry has no monopoly, but has instead a healthy competitor, efficient, energetic, and capable, with a tremendous amount of capital and revenue behind it to support its activities. This has not altogether been lost sight of by the electricity supply authorities as they are making great strides to forward the sales through publicity, exhibitions, up-to-date showrooms, and the sale of apparatus on hire and hire-purchase, in fact, the £.s.d. side is now recognised as of supreme importance. This being so it is essential to have the right man in the right place, and furthermore, the right men of mature business experience to assist him to control the destiny of an undertaking and ensure success.

Strained Relations

At the present time the relationship between the technical man and his commercial colleague is often one of mutual antagonism, the technical side being undoubtedly jealous of the commercial man's importance, and hostile where his advancement is concerned. Jealousy is a tribute and hostility a homage, but this does not advance the cause; it certainly does not tend to that efficiency which could be attained.

It is necessary to-day to create new designations for the personnel of the staff owing to the increasing responsibilities of the industry and its normal expansion. Some of the existing designations appear quite clear but underneath the surface some are aiming at the control of the business side, despite their nomenclature. Many are not graded under the National Joint Board Schedule but are given a grade sometimes higher than scheduled occupations of as equally a responsible nature, enhancing their status at the expense of others. This particularly refers to the commercial man who has no scheduled grading and consequently loses prestige, in spite of his experience and greater knowledge of the requirements of the commercial side.

Consequently we have commercial men highly trained and experienced in every branch of the business side and also, by mature experience, with the necessary technical knowledge. Is this asset to be exploited to the full extent, or are these potentialities to be allowed to lie semi-dormant and a loss to the industry? It is not a question of how well we are doing, but how much better we could do.

It is the duty of a technical man to act in an advisory capacity giving consumers technical advice and his work is of the greatest importance in negotiating power loads and special supplies. After this stage co-ordination with the commercial department is called for and the manifestation of the team spirit which stimulates morale.

Commercial Men as Chiefs

The chance of the commercial man becoming chief executive is remote, but there is no reason why he should not have the opportunity. What are the qualifications necessary for the manager of an electricity undertaking? They are knowledge of organisation, administration, Electricity Supply Acts and regulations, hire and hire-purchase Acts, commercial law and finance, business efficiency and ability to control staffs. He must also be able to present lucid reports to his committee on progress and suggestions for intensifying business, but above all he must have the ability to apply his knowledge. These qualifications are possessed by many commercial men to-day.

Another matter which concerns both engineers, managers and commercial men is the inroads into the administration of their undertakings by the borough treasurer's department which will have to be checked unless the electricity department is to lose personal contact with its consumers. Personal contact is essential to the success of any business; failure to maintain it will give the industry as a whole a setback and not all the publicity in the world will recover the lost ground.

It seems to me imperative that the commercial men should organise and have their own professional association. Otherwise they may find that their present unenviable position will be worse in the future.

Parliamentary News (BY OUR SPECIAL REPORTER)

East Anglian Breakdown

IN the House of Commons on February 15th Colonel Burton asked the Minister of Transport whether his attention had been drawn to the failure of electric lighting in East Anglia during the recent storms as a result of broken overhead cables; whether he had considered the possibility of placing these cables underground to render them safer from storms and general vulnerability; and could he give any indication of the number of men who could be employed on this work.

Mr. Burgin said he was informed that owing to the recent exceptional weather there were certain interruptions in the supply of electricity in parts of East Anglia lasting from ten minutes up to a maximum of just over twenty-four hours; with regard to the second part of the question, this matter had been carefully examined from time to time but he was satisfied that, apart from technical considerations, the cost would be out of all proportion to any advantage. The answer to the third part of the question was in the negative.

Railway Electrification

On February 15th, during a debate in the House of Lords on railway policy, Lord Monkswell referred to what he termed the "stunt" of railway electrification. By "stunt" he meant a spectacular move that involved the spending of a great deal of money and was useless when completed. So far as he could make out the usefulness of electrification was confined to underground lines, owing to the adventitious fact that electricity did not exhaust or foul the air. On surface lines its only technical advantages were slightly quicker starting and a small saving of space in terminal stations. It was enormously expensive to install, and an electric motor cost roughly twice the price of a steam locomotive of equal power. Owing to difficulties of springing, the heavy motors of electric engines knocked the road to pieces, and the vibration thus set up caused acute discomfort to passengers. Nor was there any reason to suppose that electrification paid. The Southern Railway had again and again been asked for particulars of the finance of electrification and had always refused to give them. Again, the chairman of the Great Western Railway had recently said that the electrification of the whole of the main line west of Taunton was under consideration, and he had added that a firm of electrical engineers had been asked to report on the subject. It was, of course, a foregone conclusion that they would report strongly in favour of a large expenditure of money in their own trade.

Lord Balfour of Burleigh said he would have thought that it was absolutely *res judicata* that for dense suburban traffic electrification was the only possible system by which to get the maximum traffic which was necessary in the circumstances we had to face to-day. The real point about electrification, of course, was that where there was dense traffic the maximum number of trains could only be obtained by electrification. A very much larger number of trains could be run per hour than when steam was the motive power.

Lord Erne, replying for the Government, said that electrification had many advantages in suitable conditions. Rapid acceleration and ease of reversing at terminals were very real advantages.

A Leyton Contract

On February 16th Mr. Liddall asked the Minister of Health if he would state why the tender of Mr. John Leech, electrical engineer, of Leytonstone, for the installation of electric lighting in the proposed new library and lock-up shops at Harrow Green, which was the lowest tender of twenty firms publicly invited to tender, and was recommended to the Leyton Borough Council by the appropriate committee for acceptance, was not accepted.

Mr. Elliot said that he understood that the tender in question was not recommended to the Borough Council by the committee. The committee ordered an inquiry to be made and a report to be made to the Council. After consideration of this report the Council resolved that the next lowest tender should be accepted. When this matter came before him in

(Continued at foot of next page.)

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

AT the ordinary general meeting of the North-Eastern Centre of the Institution of Electrical Engineers held at Newcastle-upon-Tyne on February 13th **Mr. H. B. Poynder**, M.I.E.E., and **Mr. H. R. Viall**, A.M.I.E.E., were presented with gifts, subscribed for by the members of the Centre, to mark their retirement from the offices of hon. secretary and assistant secretary respectively. In making the presentation the chairman, Mr. F. A. Orchard, paid tribute to the services which they had rendered to the Centre over a period of nearly twenty years.

Mr. R. A. Erskine, son of the late Mr. A. Erskine, has been appointed managing director of Erskine, Heap & Co., Ltd., as from February 1st. Mr. Erskine was educated at Charterhouse and Pembroke College, Cambridge, obtaining a B.A. degree in engineering. He spent a number of years of apprenticeship at various large engineering works and joined Erskine, Heap & Co.,

Mr. R. A. Erskine

in 1929, becoming a director in 1932. Several years ago he made an extensive business tour in South Africa where the company has important interests. He is an associate member of the Institution of Electrical Engineers.

The annual dinner of the Birmingham Branch of the Electrical Contractors' Association took place at the Midland Hotel, Birmingham, on February 17th, **Mr. W. T. Hellaby** presiding. Mr. W. Riggs, president of the Association, stated that the relationship between the Birmingham Corporation and the electrical contractors was a happy one. Such conditions did not obtain in all places. There was a great necessity for compulsory registration in their branch of the industry to prevent the type of installation carried out by amateurs and irresponsible contractors. Mr. Walter Higgs, M.P. (Higgs Motors, Ltd.) urged that compulsory registration was essential, pointing out that many fires were due to faulty wiring. Speaking generally, the British electrical industry was very efficient, and if all industries were in the same position in this respect, our export trade would be in a very different position from what it was to-day. Those present included Sir Ernest Canning, Deputy Mayor of Birmingham, Mr. F. Forrest, city electrical engineer, Mr. E. J. Jennings, former commercial secretary of the Birmingham Corporation Electric Supply Department, and Mr. H. Joseph, vice-chairman of the South Midland Centre of the Institution of Electrical Engineers.

The Lancaster Branch of the E.C.A. held its annual dinner last week at the Broadway Hydro, Morecambe. **Mr. A. Smith** (vice-president), who deputised for Mr. L. C. Penwill, congratulated the Branch on its 50 per cent. increase in membership and said that there was no room in the Association for "kerbstone" contractors. He thought that supply engineers would be better employed giving more serious attention to "black-outs" instead of selling kettles, washing machines and flashlights. Mr. Percy Clegg (borough electrical engineer, Morecambe) commented on the good working arrangements between the manufacturers and the contractors, and between the manufacturers and the supply authorities, but said that in spite of the advancement of electricity in these enlightened days, there still seemed to be a difference of opinions and a divergence of views between the contractors and the supply authorities. A whist drive and dance followed the dinner.

Speaking at the East Retford Corporation Electricity Department employees' annual dinner **Mr. C. G. Bloore**, engineer and manager, said that electricity to-day was regarded as a necessity and not a luxury. Their Department now had over 7,000 consumers as compared with 2,000 in 1933. The capital expenditure at the end of the present year would be about £300,000.

Mr. A. V. Burnett, acting manager of the contract department of W. T. Henley's Telegraph Works Co., Ltd., during the illness of the late Mr. J. F. H. Colyer, has been appointed to the position of contract manager as from February 1st. Mr. Burnett entered Henley's service in June, 1911, as a junior in the contract department, was on active service from 1916 to 1919, when he returned to his department as assistant in an administrative and technical

Mr. A. V. Burnett

capacity. In 1927 he was sent to India to carry out the important duties of chief assistant to the engineer in charge on the G.I.P. Railway contract. On his return in 1929 he served on various Henley contracts as contract engineer and was appointed engineer in charge of Northern Ireland contracts in 1935. In 1937 he was appointed chief commercial contracts in 1935. In 1937 he was appointed chief commercial assistant in the contract department, and acting manager in May last.

Mr. W. F. W. Richardson, partner in the firm of E. Wright & Co., presided at the annual staff dinner held at the King Edward Hall, Finchley, on February 17th, and in responding to the toast of the firm, referred to the progress which it had made and paid a tribute to the staff. Mr. H. Southey, his partner, also spoke.

Mr. J. D. Harvey, A.M.I.E.E., of Edinburgh, has been appointed mains superintendent with the Kirkcaldy Corporation Electricity Department.

The I.E.E. Dinner.—We regret that errors occurred in the inscription beneath the pictures of guests at the I.E.E. dinner which were reproduced in our last issue. The first picture showed Mr. P. Hunter-Brown, Dr. C. C. Paterson and Col.

At the I.E.E. dinner: Mr. H. Warren, Mr. T. H. Boyd, Dr. L. F. Morehouse and Mr. G. W. Gilman

A. S. Angwin. The photograph of the four gentlemen whose names were incorrectly given is reproduced herewith. The following names were given in the reverse order: 2, Messrs. H. T. Young, H. C. Lamb and P. V. Hunter; 3, Sir George Lee and Sir John Anderson; and 6, Dr. A. P. M. Fleming and Sir Cyril Hurcomb.

Mr. H. Cowan-Douglas has been appointed a director of the Clyde Valley Electrical Power Co., and of its three subsidiaries,

Parliamentary News (*Continued from preceding page*)

connection with an application for loan sanction, he saw no sufficient reason in this instance for interfering with the discretion of the Council. He accordingly approved the acceptance of tenders as proposed by them.

Supply in North Lincolnshire

Colonel Heneage asked what progress was being made in supplying villages in North Lincolnshire with electricity.

Mr. Burgin said he assumed that Col. Heneage was referring to the villages mentioned in his previous question on December 14th, 1938. He was informed by the Electricity Commissioners that their inspector had visited the locality. He reported that the prospective revenue in relation to the capital expenditure involved was insufficient to induce the company to carry out this development at the present time, but that if, at some future date, the company found it necessary to provide a ring main in this part of their area its construction would probably facilitate the provision of a supply to these villages.

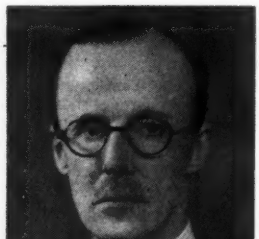
L.N.E.R. Work

Mr. Bull asked the Minister of Transport if he could now make any statement as to the proposed electrification of the Enfield branch line of the London and North Eastern Railway.

Mr. Burgin said he was informed by the railway company that until further progress had been made with its extensive programme of improvements in the London Passenger Transport area it was impossible for it to contemplate further schemes of electrification.

the Lanarkshire Hydro-Electric Power Co., the Strathclyde Electricity Supply Co., Ltd., and the Clyde Valley Accessories, Ltd.

Mr. F. Smith, manager of the M.O. Valve Works, Hammersmith, has been elected president of the Faraday House Old Students' Association for the current year. Mr. Smith received his training at Faraday House Engineering College and later was appointed factory superintendent of the Osram-G.E.C. Lamp Works, which position he held until 1923 when he became manager of the M.O. Valve Co., Ltd., Osram Works, Hammersmith. He holds the Faraday House diploma and is a member of the Institution of Electrical Engineers. **Mr. C. Kibblewhite,** M.I.E.E., distribution engineer, Central London Electricity, Ltd., has been elected vice-president of the Association.



Mr. F. Smith

Dr. S. Parker Smith, Professor of Electrical Engineering at the Royal Technical College, Glasgow, has been nominated for the chairmanship of the Scottish Centre of the Institution of Electrical Engineers to fill the vacancy which will occur on September 30th.

A prophecy that in the near future the Government would shut down many of the smaller electricity undertakings still in existence was made by Mr. J. A. K. Brydges, borough electrical engineer, Eastbourne, at the annual dinner on February 17th of the Eastbourne, Bexhill and Hastings branches of the Electrical Contractors' Association. He said that he had been told that the recommendations of the MacGowan Committee were to be proceeded with and that voltage of supply would be standardised. This would involve alterations to apparatus, which would keep contractors busy. **Mr. H. Beney,** chairman of the Eastbourne branch, presided over a company of 160 at the dinner and among the speakers were Mr. C. Taylor, M.P., the Mayor of Eastbourne (Ald. A. E. Rush) and Mr. H. T. Young (past president of the Institution of Electrical Engineers). Mr. Young said that one of the great responsibilities of the electrical industry was to educate consumers in the uses of electricity and to provide proper facilities for using it. That was why good relations between local authorities and private traders was essential.

Mr. James Orr asks us to state that his present address is the Conservative Club, Glasgow.

Mr. J. W. Marshall has been appointed shift charge engineer with the Hull Corporation Electricity Department.

OBITUARY

Mr. E. C. Ransome, chairman of Ransomes, Sims & Jefferies, died at Ipswich on February 15th at the age of seventy-four. Mr. Ransome entered the workshops of the Orwell works and two years later became manager of the foundry. Later he was given charge of the cost and wages departments. After a period as traveller for the company, he became managing director on the death of his father in 1905, retaining this position until 1919, when he was appointed chairman. He was awarded the O.B.E. in the latter year for his services in connection with the supply of agricultural machinery during the war.

Mr. S. J. Pemberton.—The death is announced of Mr Samuel J. Pemberton, aged fifty, son of the late Mr. R. T. Pemberton, who was trained as an electrician with Dick, Kerr & Co., of Preston, and went to Tokio to assist in the erection of the first big power station there. Returning home, he became deputy borough electrical engineer at Burnley. Afterwards, he went into business in the Manchester area.

Ald. E. Huntsman.—We regret to record the death of Alderman Edmund Huntsman which occurred on February 18th at the age of seventy-three. He was a former chairman of the Nottingham Corporation Electricity Committee and a past-president of E.D.A.

Will.—Sir Robert Ludwig Mond, LL.D., F.R.S., chemist and archæologist, left £392,964 (net personalty £252,443).

Germany's Electrical Exports

Leading machinery markets in 1938

IN value Germany's exports of electrical machinery and apparatus advanced to a small extent last year but in weight there was a slight decline. Their total value was 317,432,000 Rm., compared with 312,290,000 Rm., and the weight 1,545,000 double centner, compared with 1,570,810 double centner. Electrical imports totalled 19,415,000 Rm. in value.

The following statement, based on the recently issued official returns, shows the value in thousands of marks, weight in double centner, and, in some instances, the number of pieces of electrical material exported, with the values and principal countries of destination of the more important groups of articles. Increases or decreases on 1937 are added for purposes of record, but comparison is, of course, vitiated by the changes arising from the inclusion in the Reich of Austria from April last and of the Sudeten area of Czechoslovakia from October last.

Outstanding destinations for the dynamo, motor, &c., group were: Up to 5 double centner, Holland, Sweden, Italy, India, Argentina, Brazil and Rumania; heavier units, Argentina, Brazil, India, Japan, Norway and Rumania.

	1938.	Inc. or dec. on 1937.
Lighting and starting apparatus for motor vehicles—		
Value Rm. (1,000)	2,343	— 1,100
Number	49,861	— 37,806
Weight (double centner)	5,693	— 3,963
Dynamos, motors, convertors and transformers, up to 5 double centner—		
Value	20,472	— 548
Number	888,990	— 402,573
Weight	86,207	— 7,239
Ditto, from 5 to 30 double centner—		
Value	6,817	— 113
Number	4,397	— 144
Weight	45,041	— 3,905
Ditto, over 30 double centner—		
Value	9,359	— 741
Number	789	+ 55
Weight	84,449	— 5,461
Armatures and commutators—		
Value	3,111	— 162
Weight	13,720	— 267
Cable—		
Value	24,428	+ 2,124
Weight	435,158	+ 46,957
To Holland	4,529	+ 1,989
,, Sweden	2,896	+ 656
,, Argentina	1,068	— 1,032
,, South Africa	1,018	— 212
,, Ireland	1,412	+ 942
,, Rumania	2,210	+ 440
Accumulators, plates, etc.—		
Value	4,190	+ 587
Weight	45,960	+ 5,798
To Holland	930	— 40
,, Finland	175	+ 40
,, Argentina	322	— 18
,, Chile	244	+ 159
,, Sweden	352	+ 45
,, India	124	— 116
,, Netherlands Indies	158	+ 83
Electric irons—		
Value	893	— 184
Heating and cooking apparatus—		
Value	9,111	— 79
Galvanic batteries and parts and heating elements—		
Value	3,265	— 335
Weight	29,976	— 1,294

	1938.	Inc. or dec. on 1937.
Measuring and recording instruments—		
Value	21,061	— 1,089
Weight	18,227	— 1,043
To Soviet Union	538	— 772
,, Belgium	937	— 53
,, Holland	1,946	+ 496
,, Great Britain	1,625	+ 80
,, Sweden	2,047	+ 157
,, Argentina	394	— 736
,, Italy	1,202	+ 82
,, Czechoslovakia	823	— 67
Metal filament lamps—		
Value	9,109	— 1,641
Thousands	42,580	— 9,236
To France	408	— 312
,, Denmark	725	— 235
,, Sweden	645	— 45
,, Italy	624	— 66
,, Chile	261	— 319
,, Argentina	223	— 127
Telephone material—		
Value	18,352	+ 1,522
Weight	12,660	— 80
To Jugoslavia	940	— 140
,, Italy	2,113	+ 291
,, Holland	4,485	+ 1,085
,, Greece	1,267	— 467
,, China	1,122	— 68
Radio material—		
Value	37,022	+ 3,432
Weight	43,882	+ 1,992
To Finland	1,259	+ 119
,, France	1,340	— 770
,, Italy	1,196	+ 36
,, Holland	2,861	— 39
,, Sweden	2,435	— 115
,, Switzerland	1,326	+ 196
,, Turkey	908	+ 598
,, Brazil	1,651	+ 471
,, Japan	2,364	+ 1,434
,, Denmark	1,175	— 215
Safety and signalling apparatus—		
Value	3,880	— 80
Weight	7,185	+ 255
To Great Britain	350	— 480
,, Argentina	226	— 64
,, Holland	684	+ 244

	1938.	Inc. or dec. on 1937.
Ignition apparatus, &c., and parts (excl. magnetos) and elec. accessories for motor vehicles—		
Value	13,300	— 2,150
Weight	17,960	— 2,450
To France	916	— 284
,, Sweden	1,590	+ 60
,, Italy	1,219	— 221
,, Great Britain	1,309	— 471
,, Czechoslovakia	839	— 471
Apparatus for lighting, power transmisssion, electrolysis, resistances, &c.—		
Value	69,540	— 956
Weight	220,406	— 14,794
To Belgium	3,376	— 134
,, India	1,655	— 545
,, France	2,041	— 1,084
,, Italy	2,543	+ 163
,, Holland	7,983	+ 83
,, Sweden	8,388	— 432
,, Argentina	2,700	+ 50
,, Great Britain	2,357	— 723
,, Finland	3,264	+ 134
Telegraph or telephone insulators—		
Value	2,193	— 317
Weight	33,900	— 4,380
Electro-medical and dental apparatus—		
Value	14,128	— 122
Carbon and brushes, microcarbons, etc.—		
Value	1,393	— 497
Weight	892	— 85
Arc lamp carbons—		
Value	1,940	+ 240
Weight	4,621	+ 266
Electrodes—		
Value	7,363	— 887
Weight	203,237	— 30,463
Conduit tubes of paper or cardboard—		
Value	1,318	— 427
Weight	26,555	— 11,445

COMMERCIAL AND INDUSTRIAL NEWS

New Electric Motor Works at Huddersfield. Taunton Showrooms Opened. E.I.B.A. Golf Competition. Colliery Electrification Film. Inventions Exhibition.

New Huddersfield Motor Works

PRINCESS Works, Huddersfield, the new premises of Brook Motors, Ltd., reference to which was made in our last issue, were officially opened on February 18th by the Mayor of Huddersfield, Ald. Fred Lawton, in the presence of hundreds of visitors besides directors, staff and employees of the company. The extensions mean employment for another 100 workpeople. Before opening the works the Mayor was presented with a case of pipes by Mr. Ernest Brook, founder, chairman and managing director of the company. By pressing a button the Mayor caused the release of the works' siren and also gave the signal for the machinery to be set in motion. Thanks were expressed to the Mayor and details of the progress made by Brook Motors, Ltd., were given by Mr. J. L. Brook (works manager) and Mr. W. Mills (secretary), both directors. Visitors were afterwards entertained to tea and made an inspection of sections of both the new works and of the Empress Works.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-Making Industry announces that the cost of living on February 1st (55 per cent. above the 1914 level) will not involve any alteration in wages on the third pay-day in March.

Effect of Lighting on Posters

Last October a committee of the British Poster Advertising Association was given the task of exploring the various means of offsetting or reducing colour distortion by mercury or sodium vapour lamps. In its report the committee states that in the case of mercury lamps the manufacturers have now solved the problem by spraying the glass internally with fluorescent powder, and it considers that every public authority should be convinced of the necessity of using such corrected lighting in the interests of public amenity and local trade, the extra cost per lamp being quite small.

New Taunton Showrooms

Many representatives of West Country local authorities and of the electrical industry attended the opening of the new electricity offices and showrooms of the Taunton Corporation by the Mayor, Councillor C. H. Goodland, on February 16th. Among those present were Mr. H. Nimmo, chief engineering inspector, Electricity Commission, and Sir Herbert Couzens, K.B.E., who was once borough electrical engineer of Taunton. The handsome building, which is situated at the Parade, the main street of the town, cost over £20,000. The design, which is modern in style, is based upon work of the Georgian period. A demonstration theatre, to seat seventy-five, is included, and regular weekly lectures and demonstrations will be given in it with the object of stimulating the use of electricity. The general contractors were Stansell & Son (Taunton), Ltd., and the work has been carried out under the supervision of Mr. L. V. Turner, the borough electrical engineer.

The "Dominion Monarch"

S. O. Bowker, Ltd., ask us to state that about 148 dozen "Tenby Pilot" capstan semi-recessed switches in cream were fitted throughout the *Dominion Monarch* which was described in our issue of February 10th.

E.I.B.A. National Golf Competition

Mr. H. Senior Fothergill, the secretary of the E.I.B.A., tells us that competitors' cards for the competition for the Sir Montague Hughman Trophy can now be obtained from him at 6, Southampton Place, W.C.1. The price is 2s. 6d. each. The rules provide that any male amateur golfer directly or indirectly connected with the electrical industry with a club handicap of 24 or less is eligible to enter. Qualifying rounds will be played on recognised courses and there will be regional finals and a final round on a course near London on a date to be fixed.

Television at a London Store

The largest television exhibition to be held in a departmental store was opened on February 13th at Selfridge's Oxford Street store by Mr. Jack Hulbert. The exhibition, which has been arranged by H.M.V. with the co-operation of the B.B.C. and E.M.I., includes a large studio and a complete Marconi-E.M.I. transmitter. Every available make of televisor is linked to the transmitter, which will transmit the B.B.C. programmes as well as those emanating from the model studio, providing a continuous programme from 10.30 a.m. to 7 p.m. There are thirty-eight receivers in the exhibition hall and these have been arranged in separate low three-sided booths from which the visitors can see the actual performance in the glass-fronted studio. A further fifteen televisors are distributed throughout the store. The exhibition remains open for seven weeks.

Mr. Gordon Selfridge, Jun., being televised at the opening of the exhibition at Selfridges

An Advertising Novelty

We have received from David Brown & Sons (Hudd.), Ltd., a model "Radicon" worm reducer which serves as an attractive combined paperweight and cigarette box. It is a somewhat intricate moulding in a pleasing shade of grey.

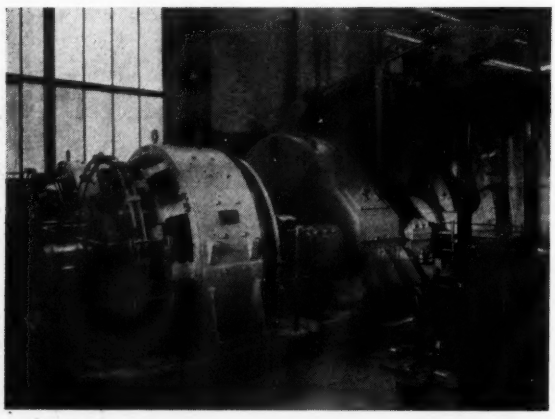
"Planned Electrification"

By means of a film which takes forty-five minutes to show the Metropolitan-Vickers Electrical Co., Ltd., demonstrate the great advances that have been made in the last few years in the design of electrical colliery plant. This film, which has technical rather than entertainment value, had its première in the Central Hall of the Research Department, Trafford Park, Manchester, on February 14th before an audience of electrical engineers, representatives of colliery companies and the Press. "Planned Electrification," which will be shown at technical schools and to mining and electrical engineers throughout the country, tells the complete story of the reorganisation of the surface plant at Bickershaw Colliery, near Leigh (Lancs), during the past two years. As the whole of

Two stands at the British Industries Fair, Birmingham: (Left), the display of Birmingham Electric Furnaces, Ltd., and (right) the exhibit of Revo Electric, Ltd.

the electrical equipment contract was entrusted to Metropolitan-Vickers, they were able to put forward a system of co-ordination calculated to give the most economical and efficient results.

Produced by Mr. Marcus Cooper, the film has taken three years to make, as it was begun before the electrification scheme was commenced. From the old methods of working the colliery the film proceeds to show the construction of the electrical plant at the M.-V. works in the foundry, machine shops, assembly shops, the test bed and the research department. There are "close-ups" of the plant in the new power



A "shot" from "Planned Electrification" showing a 3,600/7,200-HP automatic skip winder at Bickershaw Colliery

station, a 3,600-HP winding engine, headgear, screens, surface conveyors, dry cleaning plant, a boiler house, and shaft bottom equipment. At No. 4 shaft there has been installed an automatic electric skip winder, one of the first to be installed in this country, capable of dealing with 450 tons per hour, or over 3,000 tons per shift, as against 450 tons per shift by the old method of working.

The coal is carried from the shaft by overhead conveyors to the new screens and the whole plant, including the winder, is completely interlocked. All surface conveyors and screens are push-button controlled and are divided into groups for dealing with each class of coal. The starting of the belts in correct sequence in each group is accomplished by a single push-button. Between thirty and forty motors, spread over a distance of 350 yards, are started in this way, and the scheme has proved entirely satisfactory during the six months it has been in operation. The control is carried out from two push-button stations, and the plant can instantaneously be closed down from any one of nineteen points.

This film marks the beginning of a new era in the dissemination of technical electrical data, since it embraces not only pictures of the plant at work but diagrams and graphs and a spoken commentary of outstanding lucidity.

Dutch Electrical Imports and Exports

The following tables show Holland's imports and exports of electrical machinery and allied material during 1938 as compared with the preceding year. It will be seen that the imports show a marked advance and exports a slight decrease. The sterling value of the totals converted at 8.70 guilders to the £ have been added:—

	Imports.		Exports.	
	1937. Value in 1,000 guilders.	1938. Value in 1,000 guilders.	1937. Value in 1,000 guilders.	1938. Value in 1,000 guilders.
Electric generators and parts	1,218	1,556	502	732
Electric motors and parts ...	2,372	3,603	1,463	1,669
Radio sets and parts ...	9,128	8,036	52,654	44,837
Telegraph and telephone material	5,197	6,596	320	361
Electric vacuum cleaners and parts	948	1,013	290	461
Electric measuring instruments and other apparatus ...	9,489	11,105	4,212	5,858
Electric wires and cables ...	3,683	5,176	3,626	3,482
Electric lamps over 16 V ...	418	352	5,682	4,081
Electric lamps under 16 V ...	178	188	1,695	1,354
Other electric lamps	38	56	1,127	1,257
Cycle lighting dynamos ...	131	159	62	285
Cycle lighting dynamo parts...	78	114	3	31
Cycle electric bulbs	1,129	1,043	143	150
Bulbs for electric lamps ...	165	195	1,461	1,340
Electric and other refrigerators	424	718	10	6
Electric locomotives	16	1,836	176	5,107
Total, guilders	34,612,000	41,746,000	73,426,000	71,911,000
Total at 8.70 guilders to £...	£3,978,390	£4,798,471	£8,439,770	£8,265,632

Refrigerator Equipment on the "Coronation Scot"

Delco-Remy & Hyatt designed and built a special DC motor to operate the refrigeration equipment on the "Coronation Scot," shipped by the L.M.S. for exhibition at the New York World's Fair. The motor is ½-HP and is totally enclosed, the windings being designed for the wide variation in voltages encountered in railway work. The train's refrigeration equipment consists of three two-door cabinets supplied by Frigidaire, two measuring 2 ft. 4 in. wide and one measuring 4 ft. wide. The evaporators are of the direct-expansion type known as the Frigidaire FSC-15TF and are fitted with three ice-making trays giving 6 lb. of ice in cube form per freezing. In conjunction with these three evaporators Frigidaire supplied one of their latest type flowing cold compressors (Model F2-50 Freon fully automatic air-cooled). The Delco motor and compressor are fixed beneath the floor of the restaurant car, and are slung from the framwork on special iron girders. While the train is running the electricity supply is taken from direct-driven generators and when the train is stationary the supply is then automatically switched over to a battery which is charged while the train is running.

E.D.A. Activities

Attention is drawn in the March sales and publicity programme to the national drive in newspapers and magazines which the Association is commencing at the beginning of March in connection with its water-heating campaign, and an order form is enclosed with the programme of the various sales aids which are available for local advertising. With the issue of two new designs of poster in connection with the current water-heating campaign, the Association now offers twenty-five sixteen-sheet and thirty-six double-crown posters. Also enclosed with the programme is a folder setting out the facilities offered by Sound-Services, Ltd., for road show service, hire and maintenance of projectors, and sale and service of equipment in connection with the exhibition of E.D.A. films. The double-crown spring-cleaning poster (E.D.A. 1217) has been re-issued in response to many requests.

I.E.E. (North Midland Centre)

The annual dinner of the North Midland Centre of the Institution of Electrical Engineers will be held at the Hotel Metropole, Leeds, on March 3rd. Tickets (12s. each for members and 10s. each for graduates and students) can be obtained from Mr. K. C. Coop, hon. secretary of the Centre, 36, Park Place, Leeds, 1.

Exhibition of Inventions

An electric kettle with a spiral tube inside permitting it to heat (say) milk as well as water; a portable air-conditioning cabinet; an automatic fire alarm system; an improved loud speaker incorporating a small diaphragm enclosed in a chamber with an outlet surrounded by a further chamber containing sound-absorbing material; and an electric cooker which, by utilising the fact that oil vapour is a better heat conductor than air and also by recessing the hotplates in the hob and using special saucepans, is claimed to require 40 per cent. less electricity than the normal cooker. These are some of the interesting domestic appliances which until to-morrow (Saturday) can be seen at the Exhibition of Inventions at the Royal Horticultural Hall, Vincent Square, S.W.1. As might be expected, Air Raid Precautions have proved a popular field for the ingenuity of inventors and one of the electrical devices makes it impossible for a light to be switched on without lowering the blind or drawing the curtain. Automobile acces-

The stand of the General Electric Co., Ltd., at the B.I.F.

sories are also well represented and are mainly concerned with anti-dazzle and fog lamps. One contrivance, which is said to be particularly useful at sharp bends, causes the front wheels and the headlights to move in unison; the road in the direction being taken is illuminated and also indicated to pedestrians and other road traffic, glare being obviated at the same time. Another device, which can be fitted to any head lamp, is claimed both to eliminate glare and to penetrate fog. The starter, ignition and choke are brought into action simultaneously by a new starting system. An automatic control for lifts and an iodine accumulator are other new items. Among those exhibit-

ing in the trade section are Neograph, Ltd. (neon advertising signs and devices); F. E. Brown & Co., Ltd. (illuminated display cabinets fitted with turntables); Baird Television, Ltd. (television receivers); Fortiphone, Ltd. (deaf aid equipment); the Rowland-Rees Health Appliance Co. (electric stimulators); and Veret, Ltd. (a thermostatically controlled electric bed-warmer with a consumption of 6 W).

Ex-British Westinghouse Dinner

The annual dinner of the Ex-British Westinghouse Association will be held on March 10th at the Trocadero, London. Tickets (14s. 6d. each) can be obtained from Mr. L. S. Hawes, 14, Woodleigh Gardens, Streatham, S.W.16.

Trade Announcement

The Yorkshire Switchgear & Engineering Co., Ltd., announces that it has terminated its agreement with the Lindley Thompson Transformer & Service Co., Ltd., under which it has for the past five years acted as sole selling organisation for the Lindley Thompson Co.

Diesel Engine Makers' Agreement

The directors of the Brush Electrical Engineering Co., Ltd., and Blackstone & Co., Ltd., announce that a working arrangement has been entered into between their respective companies regarding the Brush range of horizontally opposed engines. The Brush range of Diesel engines will continue to be manufactured by the Brush Company and will be sold exclusively by Blackstone & Co. throughout the world as "Blackstone-Brush," and as these engines will be complementary to the Blackstone range of engines, Blackstone will be in a position to quote for Diesel engines from 3 to 2,000 HP. This arrangement will permit the Brush Company to concentrate its selling efforts on Brush-Ljüngstrom turbines and electrical products, which include motors, alternators, transformers, switchgear, etc. Whilst this arrangement is in no sense an amalgamation of the two companies, it will permit of the closest co-operation between them.

E.A.W. Activities

Of the eighty-three entrants for the ninth certificate examination in electrical housecraft for domestic science and science teachers arranged by the Electrical Association for Women at various centres on January 14th sixty-six were successful, five passing with distinction. There are now 540 holders of the certificate. The next examination will be on Saturday, June 24th, the final date of entry being May 12th.

The annual supper and ball of the Association will be held at the Café Royal, Regent Street, W.1, on March 3rd. Tickets (£1 1s. each) can be obtained from the offices of the Association, 20, Regent Street, London, S.W.1, or from the hostesses for the ball.

Electric Cookery Book

Elexcel, Ltd., has produced the "Xcel Cookery Book," which contains many useful hints to the housewife on the care, management and economic use of an electric cooker, in addition to a wide variety of recipes, with times and temperatures for various dishes. The book is published by the company at Victor Works, Broad Green, Liverpool, 14, and is priced at 1s. 6d.

The dust cover of the "Xcel Cookery Book"

"Northmet" Publicity

The North Metropolitan Electric Power Supply Co. has sent us a selection of its latest publicity material. This includes a number of attractively produced folders in colour, setting out the advantages of electric water heating, refrigeration and electric fires; and a number of reprints of advertisements which appear in the local Press from time to time.

Works Visit

The Wolverhampton branch of the E.A.W. visited the works of the Revo Electric Co., Ltd., Tipton, Staffs, for a tour of inspection, on February 15th. This party, which comprised seventy members, was conducted through the various factories of the company by members of the sales staff. The visitors were shown Revo electric cookers and appliances in their various stages of production; they also saw how Revo street lighting standards were cast in the foundry and how fittings were manufactured. The visitors were afterwards entertained to tea in the grounds of the Dudley Zoo.

New London Lamp Showrooms

The Union Lamp & Lighting Co., Ltd., has recently opened a new showroom at 31, Ebury Street, London, S.W.1, in which are displayed for the benefit of the trade the particular types of window displays that dealers may have when retailing the company's products, and also to show the comprehensive range of general purpose, architectural and automobile lamps which the company markets. This showroom is the first of a number of small showrooms which the company proposes to open both in London and Provincial centres. In the new showroom there is a complete range of architectural lamps, in white opal, coloured opal and clear and coloured ribbed frosted glass. The range of white opal lamps covers from 20 W per foot in 18 mm. glass to 250 W per foot in 50 mm. glass, and the general purpose lamps from 5 to 1,500 W. The panels on which they are displayed are of dimensions which can easily be incorporated in the display of any electrical retailer. The company offers from this showroom a sales service by which it is prepared to draw up lighting schemes and co-operate in every possible way with the trade. It emphasises that it is in no way attempting to compete with its customers, and that its new venture is to aid them and show the different methods of lighting which can be obtained from its lamps.

[Elec. Rev. photo.

The new London showroom of the Union Lamp & Lighting Co., Ltd.

Key Industry Duty

The Board of Trade has received an application under Section 5(5) of the Finance Act, 1936, for a licence to import free of duty eight gas-filled 220-kV rectifying valves. Any representations that similar instruments are made, or are likely to be made within a reasonable time, in the United Kingdom or elsewhere in the Dominions, should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, London, S.W.1, within one month from February 20th, furnishing details of such similar instruments and quoting the reference I.M. 538/39.

Prices of Materials

Henry Gardner & Co., Ltd., report, February 22nd: Copper bars (best selected). sheet and rod, no change. English pig lead, no change. Spelter, no change. English block tin, £213 10s., 15s. decrease. Mercury, no change.

Frederick Smith & Co., report, February 22nd: Electrolytic copper bars, no change. Ditto, ditto, wire rods, no change. Ditto, ditto, h.c. wire, no change. Silicium bronze wire, no change.

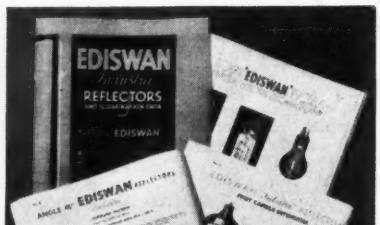
Edward Till & Co. report, February 22nd: India-rubber, Para fine, no change.

Visit to a Birmingham Factory

A Press visit was arranged last week to the Birmingham works of Bulpitt & Sons, Ltd., in connection with the introduction of the company's new kettle immersion heater. The visitors were conducted through the works and shown the nichrome strip elements being wound on to a former comprising small strips of mica which, resting on brown paper and overlapping, make a continuous strip about 18 in. long. The elements were then tested to red heat, the paper being burnt off, pressed into their sheet copper casing, and finally bent to circular shape. The cheaper utensils are aluminium pressings, but the heavy-gauge flat-bottom saucepans are pressed out as flat discs and the sides spun out, giving a hard, close-grain surface. The various finishes include polished aluminium, chromium on aluminium, and chromium on copper. All kettles are subjected to an anodic process for resistance to corrosion. In the case of the kettles the conductor for the actual element passes through the centre of the plug pins in which it is both clamped and soldered, while the socket gives a wide area of contact.

An Industrial Lighting Handbook

The Edison Swan Electric Co., Ltd., announces the publication of an industrial reflector catalogue compiled with the object of presenting a simplified handbook on industrial lighting It contains full details of fifty types of units, and each reflector is illustrated and accompanied by descriptive matter, including constructional details and recommended mounting heights and lamps. On many of the pages to this data is added diagrams illustrating typical arrangements of installations. Other fittings included and illustrated are bulkhead and well glass units, prismatic directional fittings, workshop brackets and watertight pendants. Accessories as chains, hooks, loops and brackets are also illustrated and described. Tables which assist the engineer to choose the most suitable reflector for a job are set out in a very simple form. The catalogue begins and ends with planning sheets of ¼in. squared graph paper.



The Ediswan Industrial Lighting Handbook

New Catalogues and Lists

Mavor & Coulson, Ltd., Bridgeton, Glasgow, S.E.—A leaflet dealing with electrically operated conveyors.

Londex, Ltd., Brettenham House, Lancaster Place, Strand, London, W.C.2.—Details of a new electrically operated liquid level.

Time Switches & Instruments, Ltd., 120, Victoria Street, London, S.W.1.—A leaflet describing a remote water level indicator.

Runbaken Electrical Products, 13/15, Liverpool Road, Deansgate, Manchester 3.—Particulars of a new method of plating with "Silverex."

British Thomson-Houston Co., Ltd., Aldwych House, Kingsway, London, W.C.2.—A leaflet illustrating the "Clusterlite" lighting unit, and a price list of type "B" pearl lamps.

Automatic Internal Telephones, Ltd., 30-34, New Bridge Street, London, E.C.4.—Leaflets dealing with internal telephones and loud-speaking units.

Crompton Parkinson, Ltd., Bush House, Aldwych, London, W.C.2.—Particulars of the new high wattage lamps with a resilient stem.

Visco Engineering Co., Ltd., Stafford Road, Croydon.—Catalogue No. 393 describing the recently introduced steel shell forced draught cooling units.

Lawson Beck, Ltd., Team Valley Trading Estate, Gateshead-on-Tyne.—A new publication dealing with high-rupturing-capacity cartridge fuse links.

Metalectric Furnaces, Ltd., Cornwall Road, Smethwick, Birmingham.—Details of the company's electric furnaces.

English Electric Co., Ltd., Stafford.—The following new catalogues have been issued. W.37, rising load boosters; W.36, synchronous induction motors; W.23, ironclad air-insulated draw-out switchgear; W.27 and 28, bus bodies; W.39, electric hand dryer; W.12, high-breaking-capacity air-break switchgear. The following have been revised: Q.62A., tap-changing gear; R46A. horizontal draw-out switchgear; K71B, metal-clad switchgear; N.41C, oil-immersed switch fuses; and S94B., wind cooled enclosed motors.

Private Arrangements

Standard Switchgear Co., Ltd., Hornchurch, Essex.—The representative of Insulating Materials, Ltd., one of the principal creditors, presided at a recent meeting of creditors. A balance sheet of the position at July 31st, 1938, showed liabilities of £33.897, and assets totalling £35,474, giving a credit on the profit and loss account of £1.577. It was reported that the company was incorporated in 1929, with a nominal capital of £1,000, increased in July, 1936, to £10,000. All the issued capital (£8,600) was subscribed for in cash. Two debentures for £1,500 each, carrying 10 per cent. interest, were created in favour of Mr. A. G. Collis, the managing director, in 1933, in respect of the purchase price of property acquired by the company. Debentures of £16,309 were held by the bank and were issued in 1936. On January 31st last the bank appointed Mr. C. F. Bland to act as receiver and he stated that although he had not yet been able to thoroughly investigate the position, it was obvious that the business had been conducted at a loss. It was believed that a loss had been sustained since the balance sheet for July last had been prepared. No offer was submitted, but Mr. Collis expressed his confidence in his ability to find fresh capital. It was suggested that Mr. Collis should forego his debentures and rank as an ordinary unsecured creditor, and Mr. Collis stated that he would be prepared to rank as an ordinary unsecured creditor for £3,000 of his claim and to take shares in respect of the interest amounting to £1,025. A resolution was passed agreeing to that suggestion and a committee was appointed consisting of three of the creditors to collaborate with the receiver. The following are the principal creditors:—E. N. Bray, Ltd., £345; British Electric Transformer Co., Ltd., £129; British Short Circuit Testing Station, £700; Buck & Hickman, Ltd., £183; J. B. Chirnside, £379; Hydro Dividers, Ltd., £170; Insulating Materials, Ltd., £263; Metropolitan-Vickers Electrical Co., Ltd., £202; Telegraph Condenser Co., Ltd., £164; and Turner Electric Instrument Co., Ltd., £102.

John Collier & Co. (Electrical Engineers), Ltd., 58, Stockport Road, Manchester.—The creditors met on February 15th at 7, Norfolk Street, Manchester. The meeting was called under Section 238 of the Companies Act, 1929, but it was reported that the shareholders had not passed any resolution for the voluntary liquidation of the company and the meeting was, therefore, an informal one. A previous meeting of the creditors had been held when a statement of affairs was submitted showing liabilities totalling £35,018. The issued capital of the company was £20,000, to which had to be added an increase in the value of investments of £1,982, and after taking into account the deficiency in the statement of affairs of £25,204, there was a total deficiency of £47,186. The present position of the company was attributed to taking on Post Office contracts without previous experience and to bad costing. It was further stated that the reason the shareholders had not passed a resolution for voluntary liquidation was that they hoped to be able to make a cash offer to the creditors. It was decided that the meeting should be adjourned for a week with a view to an offer of composition being submitted.

J. W. F. Sheriff, radio and electrical dealer, 39, Queen's Drive, Whitley Bay.—The creditors met on February 10th at Newcastle-on-Tyne, when the statement of affairs showed ranking liabilities of £624. The net assets were £507, leaving a deficiency of £117. It was decided that the matter should be dealt with under a deed of assignment.

Bankruptcy Proceedings

H. A. Malpas, 332, Church Road, St. George, Bristol, electrical engineer.—The public examination was held at the Guildhall, Bristol, on February 17th. According to the statement of affairs filed there were liabilities of £345, mainly due to loan creditors. In reply to the Official Receiver, debtor said he thought his assets would produce sufficient to show a surplus. He stated that he had done scientific research work in connection with radio and television. In March, 1934, he promoted a private company, of which he was managing director. The company took over one of his inventions, the consideration being 1,000 ordinary shares in the company. He was also appointed technical manager to the company but resigned that position in October, 1937. In that month he was associated with the formation of another company, to which he assigned a certain patent concerning radio valves. Neither of the two companies, it was stated, was producing commercially. Debtor said that he resigned from the board of the second company in December, 1937. The examination was closed.

H. M. Brown, trading as Wood & Co., 97, St. Helens Street, Ipswich, electrical engineer.—At the first meeting of creditors held on February 14th at 13a, Great Colman Street, Ipswich, a statement of affairs was lodged showing ranking liabilities of £1,005 and net assets of £493, leaving a deficiency of £512. Mr. J. B. Sanderson, 17, Museum Street, Ipswich, was appointed trustee with a committee of inspection.

H. V. Sore, electrical engineer, Electra House, Sun Street, Hitchin.—Receiving order made February 14th on debtor's own petition.

T. Mehew, electrical engineer and contractor, Victoria Road, Netherfield, Notts.—Last day for receiving proofs for dividend March 4th. Trustee, Mr. A. J. Rogers, 22, Regent Street, Park Row, Nottingham, Official Receiver.

J. W. Watson, electrical engineer, 154, Aldborough Road, Seven Kings, Essex.—Public examination April 5th at the Shire Hall, Chelmsford.

P. D. Watkins, radio engineer, 48, High Street, Criccieth.—Last day for receiving proofs for dividend March 1st. Trustee, Mr. I. D. Hooson, St. Peter's Churchyard, The Cross, Chester. Official Receiver.

Company Liquidations

Fern & Read, Ltd., radio engineers, High Road, Swaythling, Southampton.—The statutory meeting of creditors was held recently at Southampton, when the statement of affairs disclosed liabilities of £334. The net assets were £58, leaving a deficiency of £276 as regarded the creditors. The issued capital of the company was 205, and so far as the shareholders were concerned there was a deficiency of £481. The appointment of Mr. H. J. Weeks, 23, Portland Terrace, Southampton, as liquidator of the company, with a committee of inspection, was confirmed.

Vacuum Electric Geysers, Ltd.—Winding up voluntarily. Liquidator, Mr. J. F P. Baxter, 7, Union Court, London, E.C.2.

Wood Electric Manufacturing Co., Ltd.—Particulars of claims to the liquidator, Mr. F. G. Baker, 51-52, Chancery Lane, London, W.C.2, by March 11th.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

PARAFILM tape.
AMPLION display table.
TARRIER cells.

ELECTRICITY SUPPLY

Choice Between Electricity and Gas at Beighton and Longbenton. Commission Inspector to Visit Borrowdale. East Ashford Council Presses for Rural Extensions.

Beighton.—ELECTRICITY PREFERRED.—At a meeting held last week the Parish Council expressed itself strongly in favour of the village being lighted by electricity instead of gas, states the *Sheffield Telegraph*. A sub-committee is to meet representatives of the Sheffield Corporation Electricity Department and later proposals will be submitted to a public meeting.

Bognor Regis.—SUPPLY TO NEW ESTATE.—Mr. H. A. Harding, the electrical engineer, informs us that a sub-station with a 250 kVA transformer has just been put into commission at Craigweil, where a new estate is being developed. Craigweil was the residence of King George V during his convalescence from a serious illness.

LIGHTING.—Some twenty concrete columns with 125-W mercury lamps have now been erected in Gossamer Lane, which has been reconstructed and widened. This is part of a new scheme and it is the intention of the Council to install similar units in the town and all districts.

Borrowdale.—SUPPLY PROSPECTS.—The Parish Council has been informed by the Electricity Commissioners that Mr. H. W. Grimmitt, engineering inspector, will make a visit of inspection to the district early next month in connection with the correspondence between the Council and the Commission on the need for an electricity supply. A proposal of the Mid-Cumberland Electricity Co., Ltd., to supply the area as part of the scheme for providing a supply to the Buttermere Green Slate Quarry Co. was dropped when the quarry company withdrew its application because of the delay caused by the objections of certain societies to the erection of overhead lines.

Bourton.—PRESERVING CONTINUITY.—There have recently been a number of interruptions in the supply, and the Wessex Electricity Co. has informed the Council that measures have been taken to deal with the trouble. In addition, a scheme is in hand for erecting a new 33-kV line to enable supplies to be given from the Oxford system, and when this is in operation at the end of the summer the present Shropshire supply will be used as a standby.

Bradford.—ELECTRICAL DEVELOPMENTS.—The Electricity Committee is to erect a district transforming station in Little Horton Lane, at a cost of £6,549, and extend the sub-stations at Carr Bottom Road (£4,730), Thornton Road, Fairweather Green (£4,421) and Otley Road (£4,270).

Brighton.—SUB-STATIONS.—Application is to be made to the Electricity Commissioners for consent to borrow £2,410 towards the cost of a sub-station in Freshfield Road, with a high-voltage switchboard and 500-kVA transformer with automatic on load tap changing. The Committee has also agreed to construct a sub-station on the premises of the Marine Gate Flats.

TARIFF FOR ILLUMINATIONS.—The Electricity Committee has decided to make available, as last year, facilities for consumers to install their own decorative illuminations. For exterior illuminations, including floodlighting, during the season as from May 1st to September 30th, a supply of electricity will be afforded at an inclusive rate of 1d. per kWh. No rent will be charged for the separate meter.

LIGHTING.—The Electricity Committee has recommended that approximately £5,000 shall be expended on street lighting on trolley-bus routes.

CHANGE-OVER.—In connection with the change-over from DC to AC and the proposed sub-station at West Hill Road, some modifications of the high-voltage network have been recommended by the engineer and manager and the Corporation is applying for consent to borrow for this purpose £1,310 for cables and £3,370 for the sub-station building.

Bromsgrove.—EXTENSIONS.—The S. W. & S. Electric Power Co. proposes to carry out extensions to mains, and provide an underground sub-station in Twatling Road, Barnt Green.

Chatham.—ELECTRICITY FOR HOSPITAL.—The Town Council proposes to have electricity installed at St. William's Hospital at an estimated cost of £700.

Dartford.—CHANGE-OVER.—The supply in the western area is to be changed over to AC and plant extended at a cost of £8,852.

AIR RAID PRECAUTIONS.—The Electricity Committee is to adopt air raid precautions at a cost of £2,749.

Denny (Stirlingshire).—EXTENSIONS.—The Town Council is to borrow £800 for mains extensions and £2,000 for unspecified mains and services. With regard to the supply of electricity to the County Council housing estate at Dunipace which is in the supply area of the Scottish Midland Electricity Supply, Ltd., the Council is drawing the attention of the Electricity Commissioners to the fact that the Town Council's mains encircle this estate, and is asking them to consider an extension to the Town Council's area of supply in the district.

East Ashford (Kent).—COUNCIL AND ELECTRICITY SUPPLIES.—At a recent meeting of the Rural District Council it was decided to make efforts to secure extensions of the electricity supply in Ruckinge, Brook and Hastingleigh. It was decided to write to the Kent Electric Power Co. stating that unless a satisfactory reply was received within a week the Council would take stronger action.

Grampians.—DEMAND FOR LOWER CHARGES.—The Dingwall Town Council recently discussed a resolution that local authorities should take concerted action to procure a substantial reduction in the charges for electricity in the area served by the Grampian Electricity Supply Co. It was agreed to support the resolution if it included the Ross-shire Electric Supply Co. The Town Clerk stated that it was to be brought before the Convention of Royal Burghs in April.

Hungerford.—BETTER LIGHTING.—The Parish Council has adopted the Lighting Committee's report for the complete modernisation of the public lighting. Estimates have been obtained from the Wessex Electricity Co.

Isle of Man.—BULK SUPPLY CHARGES.—Douglas Corporation and the Isle of Man Electricity Board are still in dispute as to the basis upon which the charges are fixed for the electricity delivered as bulk supply. The Corporation has suggested that the question should be submitted to an engineer nominated by the Electricity Commissioners. At a meeting of the Town Council Alderman R. Corlett pointed out that the expert would not be acting as an arbitrator, and his report would not be binding, but would merely be for guidance.

According to the Isle of Man Correspondent of the *Manchester Evening News* Mr. W. H. Alcock, a member of the House of Keys, stated recently that the Isle could have its own Shannon Scheme in miniature. The swiftly flowing Sulby river passed through a deep valley on its journey to Ramsey and it would be a very simple engineering matter to dam the river for a hydro-electric scheme.

Leicester.—AUXILIARY LIGHTING.—A secondary electric lighting system costing about £8,000 is to be provided for the city fire brigades, following a discussion of the prospects of damage to the city's main lighting system in consequence of sabotage or any other cause.

Liverpool.—CONTRIBUTION TO RATES.—The Electric Power and Lighting Committee reports that profits from the undertaking are expected to be satisfactory enough to permit of an allocation of £70,000 in aid of the city rates. This amount is nearly equal to a 3d. rate.

Llandudno.—STREET LIGHTING.—The Urban District Council is to improve the street lighting at an estimated cost of £2,822.

London.—ISLINGTON.—The Electricity Committee is to adopt A.R.P. measures at a cost of £10,225. It is also to develop further the extra-high-voltage transmission system at a cost of £11,020.

HAMMERSMITH.—To enable a supply to be afforded to a new factory in Richford Street a sub-station is to be erected. With the necessary cables and equipment the cost is estimated at £1,557.

BATTERSEA.—The Electricity Committee is to change over the supply in the Battersea Park Road area to AC at a cost of £43,784. It is also to lay two additional extra-high-voltage feeders from the generating station to the Grayshott Road sub-station and High Trees transformer house at a cost of £16,881. A distributor is to be provided from the Nine Elms sub-station to the premises of H. Young & Co., Ltd., in Cringle Street at a cost of £806.

PARK FLOODLIGHTING.—The National Fitness Council has been instrumental in securing a grant of £1,250 to the London County Council towards the capital cost of the floodlights installed in seven parks and open spaces.

HACKNEY.—In order to afford a supply of electricity to a new housing estate the Electricity Committee is to provide further transformer sub-stations at a cost of £52,400.

J.E.A. AND THE HIRE-PURCHASE ACT.—In view of the provisions of the Hire Purchase Act the Finance Committee of the London and Home Counties J.E.A. recommends an increase in the additions to sale prices under such agreements from 7½ to 10 per cent. (two-year period) and from 10 to 15 per cent. (three year period), and the application of a five-year period to the hire-purchase of specified types of cookers.

RATING ASSESSMENT.—At the January meeting of the J.E.A. it was reported that, following the decision of the Surrey and Middlesex County Valuation Committees not to participate in a proposed conference between representatives of such Committees and the Authority, instructions had been given for counsel's opinion to be obtained. Counsel has advised in favour of an appeal to the High Court upon the arbitrator's award and as a preliminary step the necessary documents are being lodged with the Court. In the meantime, the County Valuation Committees for Middlesex and Surrey have been approached with a renewed suggestion of a conference on the points of difference to see if a compromise is possible.

AIR RAID PRECAUTIONS.—A comprehensive scheme of air raid precautions for the J.E.A.'s undertaking and staff has been prepared. The total cost (excluding any alterations at Burford) is £9,937, of which £7,081 will be required for immediate expenditure.

Longbenton (Northumberland). — GAS RECOMMENDATION REFERRED BACK.—The Urban District Council has referred back for further consideration a recommendation in favour of the acceptance of the tender of the Newcastle and Gateshead Gas Co. for street and house lighting. Councillor J. H. Wright said that people were clamouring for electricity. Most of them had radio sets and wanted to operate them from the mains. Representatives of the gas company and the North-Eastern Electric Supply Co. are being invited to attend a meeting.

Lossiemouth.—INQUIRY.—The Electricity Commissioners have informed the Town Council that with regard to the Council's proposed extension to the generating station the Commissioners will hold a public inquiry in Lossiemouth on February 28th.

Middlesbrough.—SUB-STATION EXTENSION.—The Town Council is to extend the Lime Street sub-station.

Redcar.—ROOM BASIS TARIFF SUGGESTED.—The electrical engineer has suggested that an effort should be made to increase the consumption of electricity in the daytime and has recommended a tariff of 2s. 6d. per room per quarter, plus ½d. per kWh.

St. Andrews.—VALUATION APPEAL.—The Valuation Appeal Court at Edinburgh has decided an appeal relating to the undertaking of the Electric Supply Corporation, Ltd., which supplies electricity within the burgh of St. Andrews. In consequence of an AC supply being taken from the Fife Electric Power Co., certain plant was no longer either used or useable in connection with the appellants' undertaking, and the amount of the unamortised balance of expenditure on this disused plant was £10,609. The company also incurred expenditure amounting to £8,624 on the substitution of new apparatus and the conversion of old apparatus on consumers' premises. It was agreed that the appellants were entitled to a deduction of 12½ per cent. on their floating capital and on the amount of the tenants' capital in the business. The question was whether a 12½ per cent. deduction should also be made on the sums of £10,609 and £8,624. The Valuation Committee had refused the claim by the appellants in regard to the first sum, but decided in their favour in regard to the second amount. The Appeal Court held that the Committee had erred in its determination as regards the first sum, but affirmed its decision regarding the second. Lord Fleming said the contention of the assessor was that the expenditure of £10,609 represented plant which was now derelict, and for that reason no deduction should be made in respect of it. In theory, his Lordship thought there was much force in the assessor's contention, but the principle had not hitherto been applied in ascertaining the valuation of the appellants' undertaking.

Stockton-on-Tees.—OVERHEAD LINE.—The Rural District Council has approved plans by the North-Eastern Electric Supply Co., Ltd., for an overhead line for the supply of electricity to Newby.

Urmston.—ELECTRIC PUMPING.—The Urban District Council is to convert compressed air ejectors at the pumping station into duplicate electrical pumping plant at an estimated cost of £850.

Weymouth.—SUB-STATION.—The Electricity Committee has obtained a site at Goldcroft for the erection of a sub-station.

Whitby.—METERS.—The Council is applying for sanction to borrow an additional £1,000 for meters.

Overseas

France.—RURAL ELECTRIFICATION.—Some interesting comments on electricity in rual areas are made in a report of the Société Electrique de Travaux Agricole. The price of electricity, the company points out, remained approximately stable up to 1921. Since then it has dropped in relation to other items of the cost of living. A farm worker who uses electricity for lighting only spends about 1 per cent. of his wages on electricity, while large farmers who use electricity for lighting, power, heating and cooking also find the expenditure equal to about 1 per cent. of their budget. These figures could be reduced, the company feels, if rural distributors could obtain large amounts of cheap credit for extensions and replacements. In the past few years the increase in the cost of work has made it difficult for them to develop their networks as they would like.

India. — HYDRO-ELECTRIC PROJECT. — Our Bombay correspondent reports that the Maharaja of Mysore has laid the foundation stone of the Gersoppa hydro-electric power project at the Jog Falls on the Mysore-Bombay border. The first stage is estimated to cost Rs.150 lakhs and will be capable of producing 24,000 HP. It will complete the grid for the State, the other two sources of power being the Sivasamudram generating station and the Shimshapura scheme now nearing completion. The Gersoppa project is designed in four stages each of 24,000 HP and so arranged that one or all of them can be operated as the demands for power may require. Observations have proved that there has been sufficient water in the river in the driest year on record to produce 96,000 HP continuously, or 128,000 HP at 0.75 load factor, without in any way affecting or impairing the natural beauty of the falls. The maximum quantity of water that will be required for the ultimate development of the project is only about a quarter of the flow.

Italy.—EFFECT OF TAXATION.—The annual report of La Centrale, a large power company, contains some interesting remarks on the development of electrical production in Italy. The industry, the company feels, could well undertake still further construction of new capacity which would be of the greatest benefit to the country. One difficulty in the way, however, is that debentures of power companies are no longer exempt from income tax as formerly. This has proved to be a stumbling block which has prevented many companies from obtaining the necessary funds.

Manchukuo.—LARGE HYDRO-ELECTRIC GENERATORS.—According to a Berlin report Siemens Schuckert have received an order for the delivery of four generators each of 100,000 kW in connection with the establishment of a hydro-electric works on the River Yalu.

Rumania.—RURAL ELECTRIFICATION.—A *Reuter* report from Bucharest states that as the first stage in a large programme of rural electrification, six villages in the county of Dombovitza are to be supplied with electricity in the near future. The power will be taken from stations owned by the Concordia Oil Co. Later other groups of villages will be linked up with the supply network.

Russia.—ELECTRICITY PRODUCTION PROGRESS.—The *Bulletin* of the Russo-British Chamber of Commerce states that 40,000 million kWh was produced in the U.S.S.R. last year. It is reported in *Pravda* that the consumption of water for the production of 1 kW at the Dniepr hydro-electric power station (Dnieproges) in 1938 was 11.98 cubic metres as against 12.68 cubic metres estimated.

TRACTION

Germany.—RAILWAY ELECTRIFICATION PROGRESS.—The electrified route mileage of the German State Railways is now 2,040, made up of 1,420 miles on the Reichsbahn, 568 miles on the ex-Austrian Federal Railways, 38 miles on the Munich, local railway absorbed in 1938, and 14 miles of small lines taken over from Czechoslovak interests. The electrified length represents about 5 per cent. of the present railway system. Arrangements are being made to increase the voltage of the Berlin suburban lines from 800 to 900 V DC, and the Hamburg suburban lines are being converted from single-phase to 1,200 V DC. The first section of the Nürnburg-Halle main line is to be opened to 16 kV single-phase electric traction during the coming summer.

London.—TUBE STATION ENLARGEMENT.—A contract was signed recently by the London Passenger Transport Board for the reconstruction and enlargement of the Liverpool Street underground station. During the last five years the number of passengers using this station has increased by 10,000,000 to 40,000,000 per annum and the electrification of the L.N.E.R. line to Shenfield and the extension of the Central line to Essex will add considerably to the traffic. The cost of the scheme is £150,000.

POPLAR.—The Corporation Electricity Committee reports that the British Electrical Development Association is arranging for a display of electric vehicles on a site in the vicinity of Wanstead Flats during April with a view to stimulating interest in the use of electric vehicles by local tradespeople, and the Poplar undertaking is to participate in the scheme and make a contribution towards the cost.

Turkey.—CONTROL OF ISTANBUL TRANSPORT.—It is reported in *The Times* that the Istanbul tramway and underground companies, belonging to the "Sofina" group, have been bought out by the Turkish Government for about £260,000 and £30,000 respectively.

Yugoslavia.—RAILWAY ELECTRIFICATION.—The electrification of the Susak-Zagreb railway is being discussed, states *Reuter's Trade Service*. Italian concerns are particularly interested in this scheme and one had proposed to electrify in the first place the Susak-Skrljevo section, linking it up with the Italian network of electric lines. It seems that the new projects have a much wider scope, and include not only the electrification of the whole of this line as far as Zagreb, but also the construction of a hydro-electric power station and the installation of transmission lines.

COMMUNICATIONS

China.—TELEPHONE LINK.—A *Reuter* message from Chungking states that a radio telephone service has been inaugurated between Urumchi, capital of Sinkiang Province, and Chungking, the seat of the Chinese Government. The two places are nearly 1,500 miles apart. Sinkiang, or Chinese Turkestan, is the nearest Chinese Province to Soviet Russia, with which it has close connections.

Eire.—SHORT-WAVE RADIO STATION.—The installation of an experimental short-wave transmitter at the Athlone station has been completed and a test transmission has begun. The transmitter will operate at a power of between 1 and 1.5 kW on 17,840 and 9,595 kc.

Great Britain.—TELEPHONING TO SHIPS AT SEA.—A short-range telephone service for communication with coastal ships is now available to all telephone subscribers in the United Kingdom through the Post Office coast stations, Humber Radio, Seaforth Radio and Stranraer Radio.

Telephone Progress

New Regional Administration

LAST year saw the completion of the new regional system of administration of the telephone service in London. Mr. E. Gomersall, the regional director, assisted by a staff of functional experts, is responsible for the general control of all sides of the service, but the ordinary duties devolve upon local officials in each of the eight areas into which the region is divided. Telegraph arrangements have also recently been brought within the scope of the regional organisation by the formation of a new Telegraph Branch.

During the year subscribers' lines increased by 33,000 to 653,000, and the number of telephones at the end of the year was 1,167,000, an increase of 58,000. Telephone calls originated in the Region reached a total of 1,130 million, 30 millions more than during 1937.

With the sixteen new automatic exchanges brought into service during the year London now has more automatic than manual exchanges (134 automatic, 114 manual, 5 trunk, 2 toll and 5 tandem). A new and important cable route from Langham Place *via* Wigmore Street, Seymour Street, Edgware Road, Hyde Park and Kensington Gardens to Bayswater Road was completed after nine months' work. For nearly half a mile a tunnel at a depth of 30 ft. was required. Extensive cable alterations were also made necessary by L.P.T.B. reconstruction works.

A noteworthy feature of the inland trunk service has been the completion of the London-Birmingham co-axial cable, the first of its kind to be provided for the public service. In addition, the first part of a scheme for the provision of 24 groups of 12-channel "carrier" circuits between London and Bristol was completed. Schemes have also been carried out or are in hand for cables to Southend, Worthing, Marks Tey, St. Margaret's Bay, Chatham, Salisbury, Brighton and Derby.

The "speaking clock" is increasing in popularity, the number of calls made to the clock by London subscribers in 1938 being 17,320,000, over a million more than during 1937. The service had now been extended to Edinburgh, Manchester, Glasgow, Birmingham, Leeds and Bristol by means of direct trunk circuits between each of these cities and the London equipment.

Service for Ships in Dock

In August an experimental telephone service for ships berthed in the South-west India Dock was introduced. Five lines from the telephone exchange terminate in sockets at various berths and connection with ships is established by means of plug-ended cables and telephones which are mounted in portable cabinets. Up to the end of the year over 80 ships had used the service.

Orders for the house exchange telephone system, one of the newer of the Post Office developments, showed a 77 per cent. increase over the previous year. A new hand-microphone instrument was introduced in October, with the bell incorporated in the base of the instrument. Keys and press buttons can also be directly associated for use with certain types of extensions; hitherto it has been necessary for these to be provided separately.

With the 450 additional kiosks erected during the year there are now 11,300 call offices in the Region. Although fewer applications for assistance in locating sources of interference with radio reception were received, 11,000 cases were dealt with during 1938.

In the Bradford area, where Mr. J. A. Matheson is telephone manager, the number of telephones in use increased by 2,372 to 55,721 and the number of calls originated in the area was 41,664,466, or 1.5 per cent. more than in the previous year. Continued progress was made in the conversion of exchanges to automatic working. The manually operated exchanges at Haworth and Marsden were converted and a new automatic exchange was opened at Illingworth. The development of the local cable system was speeded up during the year, with an increase of 36 per cent. in expenditure over 1937, and it is expected that the rate will be maintained throughout the next twelve months.

The 1938 report for the Sheffield area (Mr. J. Magnall, telephone manager) reveals that telegraph traffic decreased by 2.5 per cent. compared with the previous year, but there was an improvement towards the end of the year. The number of telephone stations increased by 7.1 per cent. to 44,836 and the number of calls rose by 1.6 per cent. to 37,029,800. The number of call offices has been increased from 709 to 722, and extensions have been made to seven automatic exchanges and six manual. New automatic exchanges were brought into commission at Barnsley and Winnington, and automatic working is being introduced at Holmewood, Wickersley and Worksop. Some delay in installing equipment has been unavoidable owing to the extensive nature of works being carried out; it is pointed out that the output of both equipment manufacturers and the P.O. has doubled during the last three years. A co-axial cable is being laid between Leeds and Newcastle, and the Leeds-Cambridge multi-channel cable was practically completed at the end of the year. Similar cables will follow between Leeds and Carlisle, Leeds and Manchester, Newcastle and Carlisle, and Hull and Nottingham.

The Kingston Fire

Renewal of Switchgear

PRELIMINARY discussions have taken place between representatives of the Central Electricity Board, the Kingston Corporation, and the London & Home Counties Joint Electricity Authority with reference to the replacement of the switchgear destroyed in the recent fire at the Kingston power station, and it has been agreed that it would be undesirable to install the switchgear in the old position in the engine room.

A site had been provisionally reserved some time ago for a new 11,000 V switchhouse adjacent to the 33,000 V switchhouse just completed, but from a later consideration in regard to the siting of the switchhouses and with particular reference to air raid precautions, it has been suggested that the Corporation might be able to arrange for the use of another site at the north-west corner of the existing site which would be remote from both the new switchhouse of the Corporation and the 33,000 V switchhouse of the J.E.A.

The Technical Committee of the J.E.A. has approved the carrying on of negotiations with the Corporation for the use of this site, and regarding the switchgear to be installed it has authorised the chief engineer, in collaboration with the Corporation and the C.E.B., to investigate and, if considered satisfactory, to obtain tenders for the various types which would be suitable, both of British and foreign manufacture, including the type known as oil-less or air blast. It has further agreed that the Corporation should, in collaboration with the C.E.B. and the Authority, prepare the drawings and arrange for the erection of the new building to accommodate the switchgear and for the placing of the contract for the installation of the switchgear, the financial arrangements for which will be effected either by a division of the capital cost, or the annual capital charges connected therewith between the Authority, the Corporation and the C.E.B. A preliminary investigation suggests that the cost will be of the order of £40,000. There will be, in addition, the cost of reconnecting the existing transmission cables from the old to the new site.

FORTHCOMING EVENTS

Institution of Electrical Engineers (*Wireless Section*).—Wednesday, March 1st. Institution, London, W.C.2. 6 p.m. Symposium of papers on "Direction Finding," to be presented by Dr. R. L. Smith-Rose.

Informal Meeting.—Wednesday, March 1st. Institution of Civil Engineers. 6.30 p.m. Joint meeting with the Institutions of Civil and Mechanical Engineers. Discussion on "The Economic Aspect of Replacing Manual by Mechanical and Electrical Power," to be opened by Sir Henry Jupp.

Meter and Instrument Section.—Friday, March 3rd. Institution, London, W.C.2. 7 p.m. "Review of the Design and Use of Potentiometers," by Mr. D. C. Gall.

Devon and Cornwall Sub-Centre.—Friday, February 24th. Plymouth. Annual dinner and dance.

North-Eastern Centre.—Monday, February 27th. The Newe House, Pilgrim Street, Newcastle-on-Tyne. 6.15 p.m. "The Metadyne and its Application to Electric Traction," by Messrs. G. H. Fletcher and A. Tustin.

North Midland Centre.—Tuesday, February 28th. Hotel Metropole, King Street, Leeds. 7 p.m. "Empire Telegraphic Communications," by Mr. K. L. Wood.

Friday, March 3rd. Hotel Metropole, Leeds. 7 p.m. Annual dinner.

North-Western Centre.—Tuesday, February 28th. 17, Albert Square, Manchester. 7.15 p.m. "Testing of Transmission Line Insulators under Deposit Conditions," by Prof. W. J. John and Dr. C. H. W. Clark.

Scottish Centre.—Tuesday, February 28th. Heriot-Watt College, Edinburgh. "The Mechanism of the Long Spark," by Dr. T. E. Allibone.

Western Centre.—Wednesday, March 1st. H. H. Wills Lecture Theatre, Bristol University. Faraday lecture on "The Long Distance Telephone Call," by Capt. B. S. Cohen.

Tees-side Sub-Centre.—Wednesday, March 1st. Cleveland Technical Institute, Middlesbrough. 6.45 p.m. "The Metadyne and its Application to Electric Traction," by Messrs. G. H. Fletcher and A. Tustin.

Association of Supervising Electrical Engineers.—Saturday, February 25th. Trocadero Restaurant, London, W.1. 6.30 for 7 p.m. Annual dinner and re-union.

Birmingham Electric Club.—Monday, February 27th. Grand Hotel, Birmingham. 7 p.m. "Sources of World Power Supply," by Prof. W. Cramb.

Friday, March 3rd. Grand Hotel, Birmingham. 6.30 p.m. Annual dinner.

British Electrical Development Association (*Central England Area*).—Tuesday, February 28th. Queen's Hotel, Birmingham. 6.45 for 7 p.m. Annual dinner.

Illuminating Engineering Society.—Tuesday, February 28th. 2, Savoy Hill, W.C.2. "Lighting a Modern Cinema," by Mr. T. P. Bennett.

Institution of Engineers-in-Charge.—Wednesday, March 1st. E.L.M.A., Savoy Hill, W.C.2. 7.30 p.m. "Electric Light Fittings," by Mr. H. Lingard.

Institution of Heating and Ventilating Engineers.—Wednesday, March 1st. Institution of Mechanical Engineers, Storey's Gate, S.W.1. 7 p.m. "Air Conditioning in Industry," by Mr. W. L. Fleisher.

Institute of Transport.—Friday, March 3rd. Connaught Rooms, London, W.C.2. Annual dinner.

Belfast Association of Engineers.—Friday, March 3rd. Annual dinner and dance.

FINANCIAL SECTION

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares.

New Companies Registered

Bio Electrics, Ltd.—Private company. Registered in Edinburgh February 14th. Capital, £500. Objects: To carry on the business of electrical engineers and contractors, mechanical and general engineers, &c. The directors are: H. J. Osborn, Burnside, Old Kilpatrick, and E. R. Bairds, 27, Cranworth Street, Glasgow. Registered office: 18, Gibson Street, Glasgow, W.2.

Garrett & Darton, Ltd.—Private company. Registered February 16th. Capital, £500. Objects: To carry on the business of electrical, mechanical and radio engineers, &c. The directors are: F. C. Garrett, 39, Wychwood Avenue, Luton, and J. W. Darton, Fairways, 29, West Hill Road, Luton. Secretary: J. W. Darton. Registered office: 40, Chapel Street, Luton.

Plus Products, Ltd.—Private company. Registered February 15th. Capital, £100. Objects: To carry on the business of manufacturers of and dealers in electrical goods of all kinds, including lamps, bells, fires, cookers, switchboards, &c. The directors are: C. F. P. Moore, 33, West Cromwell Road, S.W.5, and two others. Registered office: 57a, Denbigh Street, S.W.1.

Dynobatt, Ltd.—Private company. Registered February 13th. Capital, £1,500. Objects: To carry on the business of electrical, radio, motor, aeronautical, mechanical and general engineers, general electrical installation contractors, manufacturers of and dealers in electrical equipment for motor vehicles, electrical and artificial lighting apparatus, &c. The directors are: A. Church, "Newlyn," Marlow Road, High Wycombe, and four others.

Argonaut Engineering Co., Ltd.—Private company. Registered February 13th. Capital, £1,000. Objects: To carry on the business of electrical and mechanical engineers, manufacturers of marine, transport, aeronautical, agricultural, electrical and other machinery and apparatus, &c. The permanent directors are: E. A. E. Jennings and M. L. Jennings, both of "Caswell House," 632, London Road, Isleworth, Mdx. Registered office: Astron Works, Crown Yard, High Street, Hounslow.

C. L. (Wireless), Ltd.—Private company. Registered February 13th. Capital, £500. Objects: To carry on the business of manufacturers of and dealers in gramophones, radio-gramophones and sound reproducing machines, television instruments and apparatus, &c. The directors are: L. A. W. Hawkins, C.A., 162, Above Bar, Southampton; and C. R. Foot, Ballater, Deacon Crescent, Bitterne, Southampton. Registered office: 162, Above Bar, Southampton.

Loudspeaker Telephones, Ltd.—Private company. Registered February 15th. Capital, £500. Objects: To carry on the business of manufacturers of and dealers in telephones and telephone apparatus, radio apparatus, electrical apparatus and goods, &c. The subscribers are: E. J. York and W. H. Barnes, both of Lloyds Building, Leadenhall Street, E.C.3. Registered office: 63, High Holborn, W.C.1.

Returns of Electrical Companies

Statements of Capital

Electricity Services, Ltd.—Capital, £5,000 in £1 shares. Return dated December 2nd. 4,575 shares taken up. £4,515 paid. £60 considered as paid. Mortgages and charges, nil.

George H. Scholes & Co., Ltd.—Capital, £8,000 in 5,000 preference and 3,000 ordinary shares of £1. Return dated December 13th. 4,482 preference and 3,000 ordinary shares taken up. £5,096 paid on 4,096 preference and 1,000 ordinary shares. £2,386 considered as paid on 386 preference and 2,000 ordinary shares. Mortgages and charges, nil.

McGreevy Brothers (Fleetwood), Ltd.—Capital, £2,000 in £1 shares. Return dated December 14th. 1,450 shares taken up. £1,450 paid. Mortgages and charges, nil.

Cablon, Ltd.—Capital, £2,000 in £1 shares. Return dated November 2nd, 1938. All shares taken up. £1,500 10s. paid £1 on 2 and 15s. on 1,998 shares). Mortgages and charges, nil.

Adelaide Electric Supply Co., Ltd.—Capital, £3,375,000 in £2,000,000 preference stock, £750,000 preferred ordinary stock and £625,000 ordinary stock. Return dated December 1st, 1938. All stock taken up. £3,120,000 paid on the preference and preferred ordinary and £370,000 ordinary stock. £255,000 considered as paid on £255,000 ordinary stock. Mortgages and charges, £1,829,274.

Parker's Electric Service, Ltd.—Capital, £1,000 in £1 shares. Return dated December 7th, 1938. All shares taken up. £500 paid. £500 considered as paid. Mortgages and charges, nil.

Lamp Manufacturing and Railway Supplies, Ltd.—Capital, £9,000 in 5,500 preference and 3,500 ordinary shares of £1. Return dated December 8th, 1938. 4,500 preference and 3,003 ordinary shares taken up. £4,503 paid. £3,000 considered as paid. Mortgages and charges, nil.

Highgate Cable & Engineering Co., Ltd.—Capital, £1,000 in 1,000 shares of £1. Return dated December 9th, 1938. 600 shares taken up. £600 paid. Mortgages and charges, nil.

Drake & Gorham, Ltd.—Capital, £125,000 in £1 shares. Return dated November 22nd. All shares taken up. £85,000 paid. £40,000 considered as paid. Mortgages and charges, £46,082 debenture stock.

Electrical Cleaners, Ltd.—Capital, £1,500 in 1,000 preference and 500 ordinary shares of £1. Return dated December 13th. 1,000 preference and 300 ordinary shares taken up. £1,300 paid. Mortgages and charges, nil.

Mortgages and Charges

Ismay Cables, Ltd.—Charge on certain book debts due and accruing due under twenty-one contracts on which the estimated value of £83,609 is outstanding, dated February 2nd, 1939, to secure moneys due in respect of deliveries of goods made after December 21st, 1938, in accordance with an agreement dated December 7th, 1938. Holders: Westminster Bank, Ltd.

McLeod & McLeod (1935), Ltd.—Debenture charged on the company's undertaking and property present and future, including uncalled capital, dated February 9th, 1939, to secure £500. Holders: Grange Estates, Ltd., 18, Essex Street, W.C.2.

Beethoven Electric Equipment, Ltd. (formerly Beethoven Radio, Ltd.).—Satisfaction in full on January 3rd, 1939, of mortgage registered July 27th, 1935, securing £11,940.

H. L. T. Electric, Ltd.—Charge on the company's undertaking and property, present and future, including uncalled capital, dated January 30th, 1939, to secure all sums paid by chargees to Barclays Bank, Ltd., under a guarantee dated September 14th, 1938. Holder: F. Hollyfield, 14, Richmond Gardens, W.12.

Electric Development and Securities Trust, Ltd.—Deed of further charge dated February 6th, 1939, to secure sums not exceeding at any one time, with the sums secured by a mortgage dated January 27th, 1932, and a deed dated January 29th, 1935, £900,000. Property charged (*inter alia*); moneys due from certain companies. Holders: Prudential Assurance Co., Ltd.

Reliance Lift and Engineering Co., Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated January 26th, 1939, to secure £3,000. Holders: Branch Nominees, Ltd.

Receiver Appointed

Shearman Bros., Ltd.—Chas. E. M. Emmerson, of 28, King Street, Cheapside, E.C.2, was appointed receiver and manager on February 15th, 1939, under powers contained in debentures dated March 8th, 1935.

Increase of Capital

Campbeltown and Mid-Argyle Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £20,000 in £1 ordinary shares beyond the registered capital of £30,000. Practically the whole of the issued share capital is held by the Lincolnshire and Central Electric Supply Co., Ltd.

Reports and Dividends

The English Electric Co., Ltd., held its annual meeting on February 21st when Mr. G. H. Nelson (chairman and managing director), who presided, said that no profits on direct defence work arose in their 1938 operations, but they had benefited by the additional demand for their normal manufactures, which had been created by extensions in other industries associated with defence work. By far the greater part of the profits, however, was derived from the normal commercial demand for their manufactures. Their present order book was the largest that they had yet had, but stockholders must not expect them to go on expanding their business indefinitely, nor was it wise to overlook the other factor referred to in the report, namely, that the margin of profit was slightly lower at home and prices very low abroad. Referring to their activities on defence work, the chairman said that it would be their general policy to apply these profits in the first instance to further strengthening the company for the performance of its proper and normal functions. Stockholders therefore should not look for increased dividends from this source. No appreciable changes had taken place in the costs of labour and materials, and the improved results for the year under review did not arise from increased prices but from the greater turnover. Overseas business had given them a great deal of anxiety. Owing to the disturbed international position and difficulties as to payment, a large part of the world had to be excluded from the markets in which they could operate. In what remained, prices had fallen to a very low level. Referring to foreign competition, often State subsidised, he said that the Government recognised the difficulties of private concerns in meeting such competition, and was endeavouring to improve the situation. The industry, on the other hand, must help itself, for frankly it was seldom that as an industry it stood together against foreigner, and if it was to deal effectively with the problem it would have to co-operate with the full support of the Government. They were carrying the whole of the cuts associated with their big overseas contracts, although 60 per cent. of the costs of such contracts were paid to the suppliers of materials and services in Great Britain. They therefore felt they had every right to look for support and co-operation from those industries whose turnover and workpeople benefited by their enterprise. During the year they had manufactured or had in hand steam turbines of various sizes from 1,000 to 50,000 kW. They also had orders for several large pass out and back pressure turbines for various parts of the world, and they had received a number of repeat orders for steam turbines. There was still a special demand for their apparatus for electric drives for steel mills, and they also had received substantial orders for winding motors for gold mines and collieries. In spite of subsidised foreign competition they were determined to secure their proper share of hydro-electric installations, particularly in the Colonies and Dominions, and they had recently received very substantial orders for their various manufactures in this branch, though at low prices. The demand for Diesel

engines continued, and their own design of patented arc control device stimulated the demand for their switchgear. The switchgear research and testing department was providing facilities for impulse testing up to three million volts, and for breaking capacity tests up to 220 kV at powers higher than had yet been attained in this country. In the traction field large orders had been received from home and abroad for electrical equipments for operating on railway suburban lines, electric locomotives, and also for electrical apparatus for the operation of trolley-buses. They had also received substantial orders for rolling stock, rail cars, shunting locomotives and bus bodies. They were receiving a reasonable proportion of the amount of business available in industrial motors and small switchgear, although the volume had fallen away. The demand for domestic appliances, including cookers, washing machines and water heaters, was growing up progressively. With regard to the new issue of ordinary capital, this issue would result in an approximate addition to the ordinary capital of £480,000, the object of which was to finance in some measure the growing volume of normal business with which they had to deal. The issue was in no way connected with the direct defence work on which they were at present engaged.

Ismay Industries, Ltd.—Mr. A. E. Somers, who presided at the company's annual meeting on Wednesday last, became chairman in June, 1938. He put the position fully and frankly before the shareholders. He thought in June that the position could be consolidated and profits made but he realised the difficulty with 70 or 80 interlocking companies. The Price Waterhouse report which took six months to get together showed that the position of the group was perilous and consolidation impossible and that liquidation would be the only alternative without realising many of their assets. The group as a whole had an amazing lack of executive control and was, in fact, a "one-man empire." The chairman criticised the management of the 20 or 30 subsidiary companies which were not making a profit and did not justify further capital. In fact, they would not realise more than 10 per cent. of the investment. In the refrigerator group £170,000 was invested and it was now in various stages of liquidation. It still owed the bank £44,000 and the ultimate recovery would not reach this figure. Sterling Works investments amounted to £300,000; the valuation of stock resulted in writing this down to £100,000 and the name had been altered to Sterling Engineering Co., Ltd. It was now hoped to put this concern on a profitable basis by complete reorganisation. John Ismay & Sons' investments were acquired at a cost of £324,000. The sale of the lamp business was inevitable owing to guarantees given by this company to others in the group. The £150,000 investment in Ismay Cables had been largely lost and the company had never made a profit. The investment of £129,000 in the Britannia Electric Lamp Co. was disposed of for £206,500. There was also an investment of £250,000 in A. C. Cossor which stood in the books at a reasonable figure and might help the recovery of the company with Sterling Holdings. They had endeavoured to dispose of the unprofitable businesses but had not succeeded. Investigations were being continued and the board would do all it could to put the concern on a sound basis. He considered that the Sterling Engineering Co. should show later a net profit of £20,000 and the investment in A. C. Cossor might show a profit of between £15,000 and £20,000 per annum subject to the vicissitudes of the radio industry. From John Ismay & Sons little profit could be expected for some time. Altogether a credit balance of between £40,000 and £50,000 could be looked forward to after a full year's working. The ordinary share capital, amounting to £700,000, would have to be written down. Actually the losses would be £600,000 as £110,000 was being taken from reserve. It was proposed to retain the preference shareholders' capital intact. The shares were widely held and it was difficult to obtain representative shareholders' views. A number of shareholders criticised the management and asked for further details of the position of the old board of directors and of Mr. John Ismay at the moment. The chairman stated that the Price Waterhouse report would be available to any shareholder who might wish to see it. He hoped that the company would "break even" by June but he considered that if it had gone into liquidation the assets would barely have covered the bank loans. Mr. John Ismay had lent £50,000 to the company, which had been lost and he also had a life contract with the company. The present directors, unlike the previous board, had no long-service contracts.

The Yorkshire Electric Power Co.—Presiding at the annual meeting on February 20th, Sir Robert Geoffrey Ellis, Bt., said that the accounts recorded the sound position and ever-growing status of the company's undertaking. Capital expenditure during the year had included a large sum for the extension of Ferrybridge power station, the first section of which was nearly completed. The company's stations had been fully employed in meeting the demands of existing customers, and new supply contracts would assure the profitable employment of the new plant. It was necessary to make provision for still further extensions, and to provide further capital they had made an issue of ordinary shares by an offer to ordinary and preference shareholders in proportion to their holdings. The Power Co., in association with Electrical Distribution of Yorkshire, Ltd., had provided a general supply of electricity for all purposes over a wide area on terms which compared favourably with undertakings supplying similar areas. The directors were prepared, in conjunction with the directors of the distribution company, to discuss with the various bodies concerned the practicability of introducing a comprehensive district scheme by agreement without waiting for national action. Last year the sales of electricity were nearly three times those of 1928, and, despite higher wages, dearer coal, and a greater burden of rates and taxes the average price per kWh was 15 per cent. less.

Waygood-Otis, Ltd.—Presiding at the annual meeting on February 21st Mr. D. W. R. Green (chairman) said that their turnover during the year under review had been well maintained, both in new sales of lifts and escalators, as well as in the repair and maintenance departments, and their export business had now reached substantial proportions and had contributed materially to the year's results. They were able to carry over to the new year uncompleted business which ensured a satisfactory amount of production for their factory. They were fully equipped and in a strong position as leaders in the lift industry to participate in such business as was available, and could look forward to the future with confidence.

The Lancashire Electric Light & Power Co., Ltd., reports a trading profit of subsidiary companies for the year 1938, plus interest receivable, of £552,708, as compared with £506,278 for 1937, to which is added £5,290 brought in, making £557,998 available. After appropriating £37,200 for tax, £213,500 for depreciation and carrying forward £6,218, there is a balance of £301,080, to which is added management fees and sundry receipts, making £314,368. The balance available after providing for directors' fees, establishment charges and debenture interest, is £253,748, and the total available, including £7,169 brought forward from last year, is £260,917. It is proposed to pay a final dividend of 5 per cent. on the ordinary stock, making 7½ per cent. for the year (same), leaving £20,563 to be carried forward. During the year considerable extensions have been made to the mains of the operating companies to deal with increasing business, and premises have been secured in Leyland which are being adapted as a showroom. The second 50,000-kW turbo-alternator at Kearsley was put into service in October. The results of the Lancashire Electric Power Co.'s business for 1938 are as follows:—Profits from trading, £550,403 (as against £501,797 for 1937); sales of electricity, excluding export to C.E.B., 511,364,384 kWh (against 449,009,916 kWh); kWh exported to C.E.B. 266,548,000 (341,642,300 kWh); maximum load, excluding C.E.B., 157,218 kW (140,076 kW); kW connected 193,513 kW (176,213 kW).

The British Power & Light Corporation, Ltd., reports a revenue for 1938 of £233,295, as compared with £215,438, and after deducting expenses there is a balance of £221,228 (£208,989). After providing for tax, preference dividends and the interim ordinary dividend there remains £81,418, to which is added £66,742 brought in. The final ordinary dividend is 5 per cent., making 7 per cent. for the year (same) and £74,573 is carried forward. Meeting: March 1st.

The North Wales Power Co., Ltd., reports a profit of £164,730 for 1938 (against £121,940 for 1937). It is proposed to pay a first and final dividend of 7 per cent., less tax, (5½ per cent. for 1937). The figures are not strictly comparable as the share capital was doubled during 1937.

The London Electric Supply Corporation, Ltd., reports a profit for 1938 of £99,775, as compared with £110,224 in the preceding year, to which is added £91,826 brought in, and interest from investments, &c., £25,003. The final ordinary dividend is 4 per cent., making 7 per cent. for the year (same), plus a bonus of 1 per cent., being the proportion of consumers' benefit under the sliding scale. Last year a jubilee bonus of 3 per cent. was distributed. No. 2 reserve receives £4,983, contingency account £7,866, and £91,873 is carried forward. The sales of electricity increased by 4,948,985 kWh to 384,555,994 kWh. Meeting: March 6th.

The Midland Counties Electric Supply Co. reports a net revenue of £413,690 for 1938, as against £374,183 for the preceding year. The trading profits of the operating companies were £812,827 (against £767,352), of which £383,200 has been appropriated for reserves and depreciation in the operating companies. The final dividend on the ordinary stock is 5½ per cent., less tax, again making 8 per cent.

The Mid Southern Utility Co. reports a net revenue for 1938 of £89,795, as compared with £79,637 for 1937. The statutory dividends were paid for the half-year ended June 30th, and after providing for dividends on the consolidated preference stock, debenture interest, &c., it is proposed to pay the full statutory dividends of £5 19s. 6d. per cent. per annum on the "A" stock; £4 9s. 6d. per cent. per annum on the "B" stock; and £5 per cent. per annum on the "C" stock for the latter half of the year, all less tax.

The County of London Electric Supply Co., Ltd., reports net profits of £1,485,416 for 1938, an increase of £270,943 over 1937. It is proposed to pay a final ordinary dividend of 7½ per cent., making 10½ per cent. for the year (unchanged). The 1,250,000 £1 shares issued in December last do not participate in the above distribution.

The London Associated Electricity Undertakings, Ltd., proposes to pay a final dividend on the ordinary stock of 4 per cent., less tax, again making 7 per cent. for the year.

The Metropolitan Electric Supply Co. is again paying a final dividend of 7 per cent., plus a bonus of 2 per cent., on the ordinary stock, making a total distribution for the year of 12 per cent., less tax (unchanged).

The Midland Electric Manufacturing Co. has announced a first and final dividend of 10 per cent., less tax, plus a bonus of 15 per cent., less tax (both same).

Clarke, Chapman & Co., Ltd., report a profit for 1938 of £96,841. The first and final dividend is 10 per cent., less tax (unchanged), and £27,934 is carried forward (against £19,889 brought in).

The Telegraph Construction & Maintenance Co., Ltd., is paying a final dividend of 5 per cent., making 10 per cent. for the year (same).

The Cables Investment Trust is again paying an interim ordinary dividend of 2 per cent., less tax.

The Liverpool Overhead Railway Co. reports traffic receipts of £70,542 for the year ended December 31st plus miscellaneous receipts of £5,955, making a total of £76,497. Working expenses accounted for £66,112, and after providing for debenture interest there is a surplus of £3,630, which is deducted from a debit balance of £11,164 brought in, leaving a deficit of £7,534 to be carried forward. The number of passengers carried decreased from 6,959,127 in 1937 to 6,820,765 last year, and the increase in receipts was due to the revised scale of fares and improved first-class accommodation.

The Bristol Tramways and Carriage Co., Ltd., reports a net trading profit of £226,685, as compared with £164,978 in the preceding year, to which is added £21,510 brought in. The final ordinary dividend is 6 per cent., making 10 per cent. for the year (against 8 per cent.), reserve for contingencies and renewals receives £50,000 and £23,164 is carried forward. Meeting: February 24th.

The Clyde Valley Electrical Power Co. is paying a final dividend of 5 per cent., maintaining the distribution for the year at 8 per cent., less tax, on the old ordinary capital. The new ordinary capital issued in April last year receives 8.5742d. per £1 of stock, which is equal to 8 per cent. per annum calculated from dates of allotment.

Charles Clifford & Son, Ltd., report a profit for 1938 of £24,034 (against £21,597 for 1937), to which is added £22,054 brought in, making a total of £46,088. It is proposed to pay a dividend of 1s. per ordinary share, making 10 per cent., free of tax, for the year, plus a bonus of 2s. per share (against 1s. 6d. for 1937), free of tax. The balance carried forward is £22,288. Meeting: February 28th.

The Scottish Power Co., Ltd., announces a final dividend of 5½ per cent., less tax, making 8 per cent. for 1938 (same).

The City of London Electric Lighting Co., Ltd., reports a net profit for 1938 of £153,002 (subject to audit), as compared with £151,725 for the previous year. It is paying a final dividend of 4 per cent., making 7½ per cent. for the year (same).

The Uxbridge & District Electric Supply Co. announces a profit of £129,332 for 1938, as compared with £150,095 in the preceding year, to which is added £1,744 brought in. Reserve receives £8,000, and the ordinary dividend for the year is 7 per cent., tax free (against 8 per cent. on smaller capital). The balance carried forward is £1,462.

The Windsor Electrical Installation Co. reports a profit for 1938 of £19,548, as compared with £19,681 in the preceding year, to which is added £1,055 brought in. The ordinary dividend for the year is 7 per cent. (against 8 per cent.), and £881 is carried forward.

The Slough & Datchet Electric Supply Co. reports a profit of £51,928 for 1938 (against £47,682 for 1937). The ordinary dividend for the year is maintained at 8 per cent., tax free, and £1,026 is carried forward. The dividend for 1937 was paid on smaller capital.

Vickers, Ltd., are paying final dividends of 2½ per cent., less tax, on the 5 per cent. preferred and preference stock, and 2½ per cent., free of tax, on the cumulative preference stock, making in each case 5 per cent. for 1938.

The Consolidated Signal Co. reports a net profit for the year ended September 30th of £49,606, as compared with £51,416 in the preceding year. The dividend on the ordinary stock is maintained at 36½ per cent., less tax.

Companies Struck Off the Register.—The names of the following companies have been struck off the Register and they are thereby dissolved: Deansbrook Electrical Co., Ltd.; Doto-Crystal Lamps, Ltd.; Horton's Radio, Ltd.; Regent Electrical Engineering Co., Ltd.

Stocks and Shares

TUESDAY EVENING.

THE speech of Sir John Simon on Monday in this week, in which he outlined some of the principal provisions of the national finance in connection with the defence programme, is accepted in Stock Exchange circles as a reaffirmation of the Government's intention to proceed lightly in the matter of additional taxation when the Budget comes to be opened next April. It may be remembered that, from a previous speech of the Chancellor of the Exchequer, made last November, it was assumed that borrowing, rather than taxation, would be utilised in order to meet the greater part of the current expenditure on armaments. Sir John Simon's latest statement emphasises the previous impression that, if income tax is raised at all, it will be to only a slight extent.

With this to console the Stock Exchange markets, prices strengthened in most of the gilt-edged groups, investment being encouraged by the hope that an income tax of 27½ per cent. is to be regarded as heavy enough for the average taxpayer to bear under present conditions of business. For although industry continues to make progress in certain directions, in others it has yet to be shown that the coming of spring coincides with expansion of trade. The chief desideratum of the Stock Exchange markets at the present time is confidence on the part of capital, and this, from appearances in various industrial sections, is certainly returning.

The course of prices since a week ago has been in favour of holders of industrial shares. If it cannot be said that the volume of business throughout the Stock Exchange is of any great extent, it must be added that indications are present of a more cheerful frame of mind, and a greater willingness for money to seek Stock Exchange avenues for its employment.

Gilt-edged Firmness

The gilt-edged market was staggered only for a moment by the size of the armament figures. Later, the market surprised many people by more than recovering the ground previously lost. By way of explanation it has been suggested that the figures, large as they are, nevertheless fall short of some earlier estimates. More reasonable seems to be the view that people are reading into the Chancellor's statement his intention to rely on borrowing in order to bridge the gap in the nation's accounts. An impression prevails that it will be some time before the Government has to enter the market as a borrower, the assumption being that the money market can supply the Treasury's needs for some way ahead. Finally, the latest armament figures are expected to have a discouraging effect upon other entrants in the armament race. No changes of consequence have occurred in the Central Electricity or London Passenger Transport stocks. Southern Railway 5 per cent. preference regained the dividend deducted from its price last Monday.

Equipment and Manufacturing Shares

Electrical equipment shares have been a first choice in the revival of practical interest in the industrial markets. After holding up better than most in the earlier spell of weakness, prices have subsequently gone ahead with the best: yields on the leading shares are comparatively small. Explanations for these conditions are plentiful enough. On immediate considerations, the industry is regarded as being among the leading beneficiaries in the national defence expenditure. Apart from this, consideration is given to the rising electricity supply figures; the £14½ millions newly authorised for the extension of the grid; the plans for railway electrification; the 1938 electrical export figures, which stood out like the proverbial good deed among the overseas trade returns; and, not least, to the English Electric Company's highly profitable experience in a year of falling trade. In short, the electrical industries strike the investor's imagination as being reasonably certain of good employment despite the present dullness of trade; and, at the same time, as being ready to play a full part in any expansion of world trade.

General Electrics have gained a florin, rising to 79s. English Electrics, ex rights on Wednesday in this week, have gone ahead. Callenders put on 3s. 9d. to 4¼. Hopkinsons at 40s. are 2s. 6d. up. Johnson & Phillips also rose 2s. 6d. to 36s. 3d. Advances ranging from 6d. to 1s. 6d. are liberally scattered down this group. The shortage of stock becomes daily more apparent under the steady pressure of would-be purchasers.

Electricity Supply Results

Results so far published by electricity supply companies have been well up to the high standard expected of them. Among the latest announcements have been dividends at the same rate as last year's on the ordinary shares of Clyde Valley, Electrical Distribution of Yorkshire, Midland Counties, County of London, and British Power and Light, the last three also reporting an increase in earnings. The Lancashire Electric full accounts are looked upon as being all the better because of the conditions prevailing during the year in the cotton centres. Northampton Electric has added a cash bonus of 1 per cent. to the customary 10 per cent. dividend, in order to signalise the half-centenary. Profits are slightly up, according to the preliminary figures. London Electric has also paid a 1 per cent. bonus, making 8 per cent. in all, the addition coming in this case through the share of the consumers' benefit under the sliding scale. Last year, 7 per cent. dividend was paid, plus 3 per cent. as a Jubilee bonus. Prices of the shares have not been unresponsive to the encouragement of these various results, a rise of 2s. in Midland Counties, at 37s., being the best of a number of improvements.

Yorkshire Electric New Shares

Dealings began last week in the new shares lately offered to Yorkshire Electric shareholders, the price being about 4s. 6d. premium over the 30s. at which they were issued. The issue calls attention to a sometimes neglected aspect of investment in electricity supply shares whose reputation rests mainly on the reliability of profits and dividends. The growth of the industry calls constantly for fresh capital; and, from time to time, shareholders are given the opportunity as on this occasion, of subscribing for new shares on special terms. Whether the shareholder prefers on these occasions to sell his rights, or to add cheaply to his interest, the outcome makes a useful addition to his capital or income.

Underwriting

Both the Yorkshire Electric and English Electric companies have lately offered new shares at a figure well below the market price of the existing issues. In so doing, the former has revived an old controversy as to whether the expense of having an issue underwritten is properly justified on these occasions. To the contention that the success of the offer is so assured as to allow underwriting to be dispensed with, comes the answer that in these times, anything might happen between the advertisement of the prospectus and the allotment of the shares. According to this latter argument, the payment of underwriting commission is a proper insurance for a company to pay against the risk of a new issue not being fully taken up by those to whom it is offered.

Cable and Wireless Traffics

In common with other recent figures. the Cable and Wireless traffic index for January is the lowest recorded for that month since the indices began to be published in 1930. At 69, the current index shows the expected decline as compared with December, and is 2½ points below the level of the first month of last year. The numbers are based on receipts, and not on the volume of traffic. It has to be taken into consideration, therefore, that the present results still come up for comparison with figures recorded before the cut in cable charges. Prices of the stocks wavered a little after the announcement, but finally show no change, on balance, since a week ago.

ELECTRICAL COMPANIES' SHARES

Prices, dividends and yields

Company.	1938. High-est.	1938. Low-est.	Dividend. Pre-vious.	Dividend. Last.*	Price Feb. 21.	Rise or Fall.	Yield p.c. £	s.	d.
Home Electricity Companies									
Bournemouth and Poole ...	68/3	62/–	15	15	67/6	—	4	9	0
British Power & Light ...	30/9	24/6	7	7	27/6xd.	+9d.	5	1	10
City of London	34/6	28/6	7½	7½	32/–xd.	+6d.	4	13	9
Clyde Valley	42/6	33/–	8	8	36/3	—	4	8	9
County of London ...	51/9	38/9	10½	10½	44/6	—	4	14	5
Edmundson's :									
7% Pref....	33/3	30/–	7	7	30/–	—	4	13	4
Ord.	40/9	18/9	9	9	26/–	+6d.	—		
Elec. Dis. Yorkshire ...	43/6	37/9	9	9	40/–	—	4	10	0
Elec. Fin. and Securities...	51/9	49/–	12½	12½	46/3	—	5	8	3
Elec. Supply Corporation...	55/–	50/–	12	12	48/9	—	4	18	4
Isle of Thanet	21/3	18/6	4	4	20/–	—	4	0	0
Lancs Light and Power ...	35/–	26/–	7½	7½	31/3	+6d.	4	16	0
Llanelly Elec.	23/6	21/–	5½	5½	21/6	—	5	2	4
Lond. Assoc. Electric ...	32/9	28/–	7	7	28/9	—	4	17	4
London Electric	36/3	32/–	7	7	33/–xd.	+6d.	4	4	10
London Power Deb. Red.	108½	100	5	5	103½	−1	4	16	6
Metropolitan	51/–	41/–	10	12	46/3	—	5	4	1
Midland Counties	39/9	33/–	8	8	37/–	+2/–	4	16	6
Mid. Elec. Power	41/9	37/–	8	9	38/9	—	4	12	10
Newcastle Elec.	31/9	27/6	7	7	28/9	—	4	17	4
North Eastern Electric :									
Ordinary...	34/–	25/–	7	7	30/6	—	4	11	10
7% Pref....	34/–	30/–	7	7	31/–	+1/–	4	10	4
Northampton	47/6	43/9	10	10	45/–xd.	+1/–	4	9	0
Notting Hill 6% Pref. (£10)	14½	13½	6	6	13½	—	4	12	4
North Met. Elec. :									
Ordinary...	49/–	43/–	10	10	43/9	—	4	11	5
6% Pref....	30/6	28/3	6	6	28/–	—	4	5	9
Richmond Elec.	30/6	28/–	7	7	28/9	—	4	17	5
Scottish Power	38/9	32/–	8	8	35/–	—	4	11	6
Southern Areas	22/9	18/6	4½	5	20/6	+6d.	4	17	7
South London	32/6	31/–	7	7	30/–	−1/6	4	13	4
West Devon	23/3	21/3	5	5	1⅛	—	4	9	0
West Glos.	19/–	16/9	2	2	20/–	—	2	0	0
Yorkshire Elec.	42/–	36/9	8	8	35/–xr.	—	4	11	6
Overseas Electricity Companies									
Atlas Elec.	4/6	2/6	Nil	Nil	2/6	—	—		
Calcutta Elec.	44/3	36/3	12*	10*	37/6	−9d.	5	6	7
Cawnpore Elec.	40/–	35/–	10	10	31/3	—	6	7	10
East African Power ...	28/3	22/6	7	7	25/–	+1/6	5	14	0
Jerusalem Elec.	26/9	23/3	5	6	24/–	—	5	0	0
Kalgoorlie (10/–)	12/–	9/6	7½	7½	10/3	—	7	6	4
Madras	34/6	28/9	8*	8*	30/–	—	5	6	8
Montreal Power	31½	26½	1½	1½	33½	+½	—		
Palestine Elec. "A" ...	31/9	27/–	7½*	7½*	27/6	—	5	9	1
Perak Hydro-electric ...	25/3	17/–	7	6	17/6	—	6	17	2
Shawinigan Power ...	23½	16½	85cts.	83cts.	22⅝	+⅜	—		
Tokyo Elec. 6%	65½	39	6	6	60½	+3	9	18	4
Victoria Falls Power ...	76/3	55/–	12	13½	66/3	—	4	1	7
Whitehall Investments Pref.	22/3	15/–	7⅛	7⅛	18/3	+9d.	8	4	6
Public Boards									
Central Electricity :									
1950–70	115⅜	97	5	5	108½	—	4	12	2
1955–75	118½	100	5	5	112½	—	4	9	0
1951–73	111	95	4½	4½	104	—	4	3	4
1963–93	101	85	3½	3½	92½	—	3	14	10
London Elec. Trans. Gtd.	93½	88	2½	2½	87	—	2	17	1
London & Home Counties,									
1955–75	112⅞	97⅛	4⅛	4⅛	107	—	4	4	1
Lond. Passenger Transport :									
A	119½	104⅜	4⅛	4⅛	111⅛	—	4	0	9
B	122⅞	105	5	5	111⅛	—	4	9	8
C	84	68	4⅛	4	70½	+1	5	13	6
West Midlands Joint Elec.,									
1948–68	115⅛	102½	5	5	112	—	4	9	3
Telegraph and Telephone									
American Tel. & Tel. ...	160	114	9	9	167½	—	5	7	9
Anglo-Am. Tel. :									
Pref.	115½	100½	6	6	100½	—	6	0	0
Def.	28	23	1½	1½	22½	—	6	13	4
Anglo-Portuguese	23/6	19/3	8	8	21/3	—	7	10	7
Cable & Wireless :									
5½% Pref.	104	76½	4½	5½	82½	—	6	13	4
Ord.	67⅜	34	—	4	40½	—	10	0	0
Income	102½	90	—	—	100	—	4	0	0
Canadian Marconi $1 ...	6/6	3/9	—	Nil	4/6	−3d.	—		
Globe Tel. & Tel. :									
Ord.	32/6	26/3	5½*	7½*	26/3	—	5	14	3
Pref.	27/6	23/9	6	6	26/3	—	4	11	5
Great Northern Tel. (£10)...	42½	34	20	20	36½	—	5	9	7
Inter. Tel. & Tel.	12½	5⅜	Nil	Nil	9½	—	—		
Marconi-Marine	30/6	21/6	10	7½	24/6	—	6	2	4
Oriental Telephone Ord. ...	59/3	2½	12*	12*	2 5/16	—	4	18	3
Radio Corpn.	9½	4⅜	8	6	7½	−¼	—		
Telephone Props	13/9	11/3	5	6	13/9	—	8	14	6
Telephone Rentals (5/-) ...	10/–	7/6	5	6	9/–	—	3	6	8
Western Union	34½	17	2½	—	23½	—	—		
Traction and Transport									
Anglo-Arg. Trams :									
First Pref.	11/–	2/6	Nil	Nil	3/9	—	—		
4% Inc.	31	8	Nil	Nil	11	+1	—		
British Electric Traction :									
Def. Ord.	1060	675	5	6	925	+50	—		
Pref. Ord.	175	150	8	8	160	—	5	0	0
Bristol Trams	45/–	34/3	5	8	45/–	+1/–	3	11	1
Brazil Traction	14½	7⅛	$1	—	9⅛	—	—		
Calcutta Trams	26/9	21/6	8	8	25/–	+6d.	6	10	8
Cape Elec. Trams	18/6	15/6	5	6	17/6	—	6	17	2
Lancs Transport	35/3	29/3	10	10	35/–xd.	+1/–	5	14	3
Mexican Light :									
1st Bonds	39	16½	5	5	25	—	—		
Rio 5% Bonds	91	47	5	5	57	—	8	15	6
Southern Rly :									
5% Prefd.	87	48	5	5	59½xd.	+2½	8	8	0
5% Pref....	116	83	5	5	88½xd.	+1½	5	13	0
T. Tilling	60/–	36/6	10	10	2⅜xd.	+9d.	4	4	3
Tilling & B.A.	57/–	46/–	10	9*	51/3	+1/6	3	10	4
West Riding	46/3	30/6	10	10	33/9	—	—		
Equipment and Manufacturing									
Aron Electricity Ord. ...	40/3	31/–	15	15	1½	—	10	0	0
Assoc. Elec. :									
Ord.	45/3	32/–	10	10	41/–	+1/–	4	17	7
Pref.	38/9	35/6	8	8	35/6	—	4	10	0
Automatic Telephone & El.	43/–	35/–	5	10	40/–	—	5	0	0
Babcock & Wilcox ...	44/–	32/6	10	10	41/3	+⅛	4	16	9
British Aluminium Ord. ...	54/–	40/–	10	12½	55/–	+9d.	4	11	0
British Insulated Ord. ...	95/9	77/–	20	20	4 5/16	—	4	12	10
British Thermostat (5/–) ...	16/–	9/–	17½	18½	14/6	—	6	7	6
British Vacuum Cleaner(5/-)	35/9	27/–	40	40	22/–	—	—		
Brush Ord.	5/6	4/9	Nil	Nil	5/–	—	—		
Callender's	5¼	78/6	20	20	85/–	+5/16	4	19	0
Chloride Elec. Storage ...	77/9	61/–	15	20	77/6	+¼	5	3	1
Consolidated Signal ...	116/–	75/–	32½	36½	86/9xd.	—	8	8	2
Crabtree (10/–)	29/–	22/–	17½	17½	22/6	—	7	15	7
Crompton Parkinson :									
Ord. (5/–)	32/3	18/9	12½	15	17/9	—	—		
E. K. Cole (5/–)	8/9	4/6	5	10	6/3	+3d.	8	0	0
Elec. & Musical Industries (10/–)	16/3	9/–	10	5	11/9	+9d.	4	5	0
Electric Construction ...	36/–	31/–	10	12½	32/6	—	7	14	0
Enfield Cable Ord. ...	5 5/16	46/–	25	25	2⅞	—	—		
Electrical Switchgear (10/–)	27/–	22/6	16	16	26/3	—	6	2	0
English Electric	33/–	24/6	10	10	35/6xd.	+2/6	5	12	8
Ensign Lamps (5/–) ...	14/3	11/3	—	25	14/–	—	8	18	6
Ericsson Tel. (5/–) ...	2 3/16	31/–	25*	25*	37/6	—	3	6	8
Ever Ready (5/–)	26/3	16/6	45	35	22/6	+6d.	7	15	7
Falk Stadelmann	34/3	27/–	10	10	27/6	—	7	5	6
Ferranti Pref.	27/6	25/–	7	7	25/–	—	5	12	0
G.E.C. :									
Pref.	34/–	31/3	6¾	6¾	31/3	—	4	3	2
Ord.	79/3	67/–	17½	20	70/–	+2/–	5	1	3
Greenwood & Batley ...	27/6	19/–	7	15	26/3	—	11	8	2
Hall Telephone (10/–) ...	24/6	18/3	5	15	20/–	—	7	10	0
Henley's (5/–)	21/–	16/–	15	20	20/9	+9d.	4	16	5
4½% Pref.	23/–	22/–	4½	4½	22/6	—	4	0	0
Hopkinsons	40/–	32/6	10	12½	40/–	+¼	6	5	0
India-Rubber Pref. ...	21/9	20/3	5½	5½	21/3	—	5	3	6
Intl. Combustion	5/8	4¼	32½	32½	5½	+¼	5	18	2
Ismay Industries (5/–) ...	6/9	1/–	6	6	10½d.	—	—		
J. Lucas	57/9	47/6	15	15	57/6	—	5	4	4
Johnson & Phillips ...	43/9	32/6	10	12½	36/3	+¼	6	18	2
Lancashire Dynamo ...	72/3	53/–	20	25	62/6	—	8	0	4
Laurence Scott (5/–) ...	12/–	9/–	7	15	11/–	+6d.	6	16	4
London Elec. Wire ...	35/–	28/3	12	7½	29/6	—	5	1	8
Mather & Platt	49/–	41/3	13½	13½	45/–xd.	+1/6	6	0	0
Metropolitan Elec. Cable Pf.	22/–	21/–	5½	5½	21/3	—	5	3	6
Murex	93/9	66/3	20	20	77/6	+⅛	5	3	1
Pye Deferred (5/–) ...	12/–	8/–	5	25	8/9	—	14	5	8
Revo (10/–)	36/3	30/–	12	17½	35/–	—	5	0	0
Reyrolle	62/6	49/–	12½	12½	53/9	—	4	13	0
Siemens Ord.	31/–	20/6	7½	7½	22/6	+⅛	6	13	4
Strand Elec. (5/–) ...	6/–	4/–	5	10	5/3xd.	+6d.	9	10	6
S. Smith (1/–)	9/9	6/3	37½	50	7/6	—	6	13	4
Switchgear & Cowan (5/–)	19/6	12/6	20	20	15/–	—	6	13	4
Telegraph Condenser (10/–)	18/9	12/–	5	5	10/–	—	5	0	0
Telegraph Construction ...	2½	36/–	7½	10	2¼	—	4	14	1
Telephone Mfg. (5/–) ...	9/9	7/–	9	9	8/6	—	5	6	0
Tube Investments... ...	89/6	70/–	23¾	23¾	87/6	+6d.	5	8	2
Vactric (5/–)	9/9	4/6	10	4	3/3	—	6	3	2
Vickers (10/–)	27/–	17/6	10	10	23/–	+6d.	4	7	0
Westinghouse Brake ...	63/9	45/–	17½	17½	50/–	—	7	0	0
Walsall Conduits (4/–) ...	26/–	22/6	—	55	27/6	+6d.	8	0	0
West, Allen (5/–)	6/6	4/6	—	7½	6/3	+3d.	6	0	0

* Dividends are paid free of Income Tax.

NEW PATENTS

Electrical specifications recently published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1936

20917. "Electro-magnetically operated switches." A. Cianchi. July 28th, 1937. (499393.)

1937

11376. "Electron - discharge devices for voltage amplification or control." G. Krawinkel. April 25th, 1936. (Cognate applications 11377/37, 11378/37, 11379/37 and 11380/37.) (499487.)

11465. "Electric cables." Allgemeine Elektricitäts Ges. April 21st, 1936. (499396.)

14501. "Photo-electric multiple cells." Radioakt Ges. D. S. Loewe. May 30th, 1936. (499744.)

17622. "Electrically heated kettles." W. H. B. Thornton. June 24th, 1937. (499746.)

17780. "Electric protective arrangements." British Thomson-Houston Co., Ltd., T. H. Kinman and R. G. Hibberd. June 25th, 1937. (Cognate applications 20915/37 and 32928/37.) (499748.)

17795. "Telephone installations." C. Lehner, M. Gadesmann, M. Leichthammer and H. Leichthammer (trading as Telefonbau und Normalzeit Lehner & Co.). June 26th, 1936. (499588.)

20139. "Means for attaching flexible conductors to electric terminals, contacts, or the like." Belling & Lee, Ltd., and A. L. Hodby. July 21st, 1937. (499407.)

20140. "Radio frequency electric filters." Belling & Lee, Ltd., and F. R. W. Strafford. July 21st, 1937. (499590.)

20149. "Electric wave filters." C. Lorenz Akt. Ges. September 7th, 1936. (Cognate application 20150/37.) (499591.)

20350. "Electric arc convertors." British Thomson-Houston Co., Ltd. July 23rd, 1936. (499596.)

20508. "Electric switches for use in alternating-current circuits." J. H. Tucker & Co., Ltd., and F. C. Fuke. July 24th, 1937. (499496.)

20588. "Television cathode-ray tube apparatus." Radioakt Ges. D. S. Loewe. July 28th, 1936. (499815.)

20606. "Electric circuit interrupters." A. West & Co., Ltd., and E. Babler. July 26th, 1937. (499816.)

20628. "Light-sensitive electron-discharge devices." Fernseh Akt. Ges. July 30th, 1936. (499661.)

20629. "Electron-discharge devices for use in television and like systems." Fernseh Akt. Ges. July 28th, 1936. (499662.)

20635. "Electric circuit-breakers of the impulse type." A. Upton, G. Pailin and Ferguson, Pailin, Ltd. July 26th. 1937. (499663.)

20636. "Electric circuit-breakers having arc-control arrangements." A. Upton, G. Pailin, and Ferguson, Pailin, Ltd. July 26th, 1937. (499664.)

20637. "System for regulating the output voltage of an alternating current dynamo-electric generator." British Thomson-Houston Co., Ltd. July 24th, 1936. (499600.)

20639. "Electrical apparatus for comparing impulse frequencies." British Thomson-Houston Co., Ltd. July 24th, 1936. (499601.)

20640. "Protective system for high-voltage transformers and the like." British Thomson-Houston Co., Ltd., T. H. Kinman and R. G. Hibberd. July 26th. 1937. (499817.)

20671. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd. July 25th, 1936. (499665.)

20723/4/5. "Telephone systems." Siemens Bros. & Co., Ltd., H. E. Humphries, and B. A. Hensler. July 27th, 1937. (499820/1/2.)

20751. "Manufacture of alternating current rectifiers of the dry contact type." Westinghouse Brake & Signal Co., Ltd., A. E. Williams and L. E. Thompson. July 27th, 1937. (499759.)

20756. "Tuned electric circuits." Standard Telephones & Cables. Ltd., and E. S. L. Beale. July 27th, 1937. (499760.)

20773. "Automatic switches for use in telephone or like systems." Automatic Telephone & Electric Co., Ltd., R. Taylor and G. T. Baker. July 27th, 1937. (499762.)

20844. "Electrical musical instruments." A. H. Midgley and A. M. Midgley. July 28th, 1937. (499771.)

20899. "Electron-discharge devices for use in television and like systems." Baird Television, Ltd., and T. M. C. Lance. July 28th, 1937. (499828.)

20932. "Maintenance of the required diameter of electric cables during the manufacture thereof." Siemens-Schuckertwerke Akt. Ges. July 29th, 1936. (499776.)

21004. "Telephone systems." Siemens Bros. & Co., Ltd., H. E. Humphries and B. A. Hensler. July 29th, 1937. (499832.)

21005. "Telephone systems." Siemens Bros. & Co., Ltd., and B. A. Hensler. July 29th, 1937. (499783.)

21006. "Electric convertors." Siemens Bros. & Co., Ltd., W. H. Grinstead and H. S. Double. July 29th, 1937. (499411.)

21019. "Electron-discharge devices." Baird Television. Ltd., V. A. Jones and K. A. R. Samson. July 29th, 1937. (499785.)

21041. "Electric motors." British Thomson-Houston Co., Ltd., and A. H. Maggs. July 29th, 1937. (499787.)

21075. "Gas or vapour electric-discharge apparatus." Soc. Anon pour les Applications de l'Electricité et des Gaz Rares Ettablissements Claude-Paz & Silva. June 22nd, 1937. (499792.)

21108. "Metalised dielectrics and electric condensers." R. Bosch Ges. August 24th, 1936. (499795.)

21195. "Machines for making electric incandescent lamps or the like." A. Hofman & Co. May 17th, 1937. (499413.)

21230. "Electric insulators." C. W. Richards, C. I. Snow and Imperial Chemical Industries, Ltd. July 30th, 1937. (499805.)

22896. "Carrier signalling systems applicable to electric protection systems." General Electric Co., Ltd., and E. P. L. Westell. August 20th, 1937. (499512.)

25162. "Fluid-pressure operated electric relays." Chance Bros. & Co., Ltd., and L. B. H. Hallett. September 16th, 1937. (499517.)

27292. "Apparatus for controlling electrically driven reciprocating machines." W. Schweitzer. October 7th, 1936. (499421.)

30182. "Photo-electric cells." C. Zeiss (Firm of). November 10th, 1936. (499424.)

30250. "Radio and television receiving apparatus." General Electric Co., Ltd., and D. C. Espley. November 4th, 1937. (499495.)

30379. "Electron-discharge apparatus." Standard Telephones & Cables, Ltd. November 7th, 1936. (499604.)

30380. "Electron-discharge devices." Standard Telephones & Cables, Ltd. November 13th, 1936. (499681.)

31149. "Methods of capping vitreous vessels, such as electric incandescent lamps, without the use of cement." General Electric Co., Ltd. (Patent-Treuhand Ges. für Elektrische Glühlampen). November 12th, 1937. (Addition to 467956.) (499682.)

31333. "Cathode-ray tubes and the like." General Electric Co., Ltd., and J. G. Hobday. November 15th, 1937. (499532.)

31427. "Overload tripping devices for automatic circuit-breakers or similar electrical switchgear." J. A. Crabtree & Co., Ltd. (Schiele Industriewerke). November 16th, 1937. (Cognate application 31428/37.) (499533.)

32105. "Radio telegraph transmitters." General Electric Co., Ltd., and W. E. Willshaw. November 22nd, 1937. (499683.)

33256. "Short-wave electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd. December 1st, 1936. (499536.)

34741. "Amplifier arrangement for television purposes." Radioakt.-Ges. D. S. Loewe. December 16th, 1936. (499538.)

35280. "Cables for the transmission of alternating currents." Soc. Anon. des Cableries et Trefileries. December 18th. 1936. (Cognate application 35281/37.) (499687.)

1938

418. "Combinations of electric discharge devices with incandescent filaments in series with them." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen.) January 6th, 1938. (499540.)

7656. "Electric heating elements." Naamlooze Vennootschap Molybdenum Co. March 11th, 1937. (Cognate application 7657/38.) (499447.)

8742. "Heating conductors for electric furnaces." Naamlooze Vennootschap Molybdenum Co. July 22nd, 1937. (499623.)

10852. "Methods of making electrodes for electrolytic condensers." Aluminium Walzwerke Singen Ges. April 8th, 1937. (499627.)

11537. "Electrical heating apparatus and method of making same." E. L. Wiegand. April 14th, 1938. (499699.)

11876. "Electrical resistance." S.E.C.I. Soc. Elettrotecnica Chimica Italiana. April 20th, 1937. (499701.)

12881. "Printing telegraph apparatus." Creed & Co., Ltd. May 6th, 1937. (499702.)

13682. "Electrical connectors and a method of and means for manufacturing the same." British Thomson-Houston Co., Ltd. May 8th, 1937. (499564.)

14357. "Piezo-electric vibration systems." Standard Telephones & Cables, Ltd. May 14th, 1937. (499707.)

15106. "Radio direction-finding systems." Standard Telephones & Cables, Ltd. June 11th, 1937. (499712.)

15282. "Stabilised electron-discharge tube oscillator." Farnsworth Television Inc. June 5th, 1937. (499714.)

16464. "Dynamo-electric machines." R. Bosch Ges. June 11th, 1937. (499716.)

17188. "Methods of and apparatus for the production of X-rays." British Thomson-Houston Co., Ltd. June 9th, 1937. (499721.)

17661. "Electrodes for electric-discharge devices and method of making the same." British Thomson-Houston Co., Ltd. June 16th, 1937. (499570.)

17887. "Electric tumbler switches." Manuus Mfg. Co., Ltd., and H. J. Smith. June 16th, 1938. (499726.)

17942. "Methods of and apparatus for producing periodic impulses." British Thomson-Houston Co., Ltd. June 16th, 1937. (499571.)

17980. "Electrical potential regulating devices." Fabrica Italiana Magneti Marelli. June 18th, 1937. (499727.)

19149. "Liquid-filled electrical insulating bushings." British Thomson-Houston Co., Ltd. June 30th, 1937. (499730.)

19917. "Metal-vapour electric-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 7th, 1937. (499733.)

20064. "Apparatus for the electrical precipitation of suspended particles from gaseous fluids." Lodge-Cottrell, Ltd. (Siemens Lurgi-Cottrell - Elektro - filter Ges.). July 6th, 1938. (499576.)

20399. "Electric-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 12th, 1937. (499452.)

21447. "Arc-extinguishing means for electric switches." British Thomson-Houston Co., Ltd. July 19th, 1937. (Addition to 483128.) (499456.)

22961. "Resistance welding tongs." British Thomson-Houston Co., Ltd. August 3rd, 1937. (499458.)

23360. "Electric discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. August 11th, 1937. (499464.)

23374. "Metal vapour convertors." Siemens - Schuckertwerke Akt. - Ges. August 7th, 1937. (499579.)

23937. "Thermionic amplifiers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. August 16th, 1937. (499468.)

24342. "Oscillators of the type comprising a discharge tube having an indirectly heated cathode." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. August 21st, 1937. (499471.)

24692. "Devices for emitting luminous signals." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. August 24th, 1937. (499472.)

25216. "Arrangement for electro-dynamic relays." Allmanna Svenska Elektriska Aktiebolaget. September 2nd, 1937. (499475.)

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Aldershot.—April 4th. Electricity Department. Extra-high and low-voltage cables and ordinary and prepayment meters for twelve months. (See this issue.)

Angus.—County Council. Electric lighting and heating in police buildings, &c., at Montrose. R. H. Anderson, county clerk, County Buildings, Forfar.

Australia.—VICTORIA.—April 26th. State Electricity Commission. One 30,000-kW turbo-alternator for new station at Newport.

BRISBANE.—March 15th. Electric Light and Power Undertaking. Electric generating plant. (T. 18851/39.)*

Barnoldswick.—March 4th. Electricity Department. Oil circuit-breaker, 250-kVA transformer and a four-wire distribution pillar as a complete unit. (February 17th.)

Bexhill.—February 28th. Electricity Department. Stores and materials for twelve months. (February 17th.)

Bexley.—March 15th. Electricity Department. One 10,000-kVA, one 5,000-kVA and three 1,000-kVA transformers, and switchgear. (See this issue.)

Bingley.—March 8th. Electricity Department. Single-phase, 250-A testing equipment. (See this issue.)

Brighton. — March 9th. Electricity Undertaking. Tungsten filament electric lamps for street lighting and cables for twelve months, (See this issue.)

March 8th. Waterworks Department. Two electrically driven booster pumps, motors, control gear, &c., at Goldstone Works. Town Clerk, Town Hall (deposit £2 2s.).

Bristol.—March 6th. Electricity Department. Electrical requirements for twelve months. (February 10th.)

March 13th. Electricity Department. 6.6-kV and 11-kV switchgear and transformers and low-voltage sub-station switchgear. (See this issue.)

Burnley.—February 28th. Gas Department. Electrical brakes for hot coke hoist. (February 17th.)

Calderstones (NEAR BLACKBURN).—March 24th. Committee of Management. Heating services and electric lighting and telephones at the Institution for Mental Defectives. (See this issue.)

Cheadle and Gatley.—March 13th. Electricity Department. Extensions to 6.6-kV switchgear for the Bird Hall Lane sub-station. (See this issue.)

Clitheroe.—February 25th. Electricity Department. Meters, p.i. cables, conductors, and red fir wood poles for twelve months. (February 17th.)

Dartford.—February 25th. Electricity Department. Five 235-kVA, 10,000/400/230-V outdoor transformers, 1,700 yd. of 0.15 sq. in. and 400 yd. of 0.075 sq. in. low-voltage cable, and fire extinguishers. (February 17th.)

Derbyshire.—March 3rd. Works Department. Cables, lamps and sundry electrical accessories for twelve months. (February 17th.)

Dublin.—February 28th. Minister for Defence. Electrical supplies, excluding electric lamps, for Dublin Military Barracks for twelve months.

March 15th. Electricity Supply Board. Power transformers for twelve months. (February 17th.)

Durham.—March 11th. County Council. Electric mains and internal lighting at School Aycliffe Mental Deficiency Colony, near Darlington. T. T. Rees and R. Holt, architects, 64, Rodney Street, Liverpool, 1 (deposit £5 5s.).

East Ham.—February 27th. Electricity Department. Stores and materials for twelve months. (February 10th.)

Edinburgh.—March 3rd. Electricity Supply Department. Eight 1,000-kVA transformers. (February 17th.)

February 25th. Corporation. Installation of electric lighting and power in the refuse, salvage, and disposal plant at Seafield Road Depôt. Town Clerk (deposit £1 1s.).

March 16th. Conduits, frames and covers, fuse boxes and boards, disconnecting boxes, electric lamps and meters for twelve months. (See this issue.)

Egypt.—CAIRO.—March 4th. Municipalities Department. Plant for extension to Port Said power station. (T. 17942/39.)*

Eire.—CORK.—Public Works Department. March 3rd. Electrical lighting and heating installation at Collins Barracks, Cork.

Exeter.—March 4th. Electricity Department. One economiser for the Basin generating station. (See this issue.)

Eyemouth.—March 16th. Town Council. Electric lighting of 40 houses at the Glebe site. Town Clerk (deposit £1 1s.)

Farnworth. — March 8th. Electricity Department. Stores and materials for twelve months. (See this issue.)

Fife.—February 27th. County Council. Electric lighting in eight houses at Kelty. County Clerk, County Buildings, Cupar (deposit £1 1s.).

Grimsby.—March 3rd. Electricity Department. Five 11-kV kiosk sub-stations. (See this issue.)

Hazel Grove and Bramhall.—March 11th. Electricity Department. One 500-kVA and one 250-kVA transformer. (See this issue.)

Hove.—February 28th. Electricity Department. Stores and materials for twelve months. (February 17th.)

India. — NEW DELHI. — March 7th. Table standards, lampshades, lampholders, and locks for twelve months. (T. 18145/1939.)*

March 28th. One 8,000-kVA turbo-alternator set complete with oil filter and steam purifier, condensing plant including auxiliaries and pipework and recorder for measuring condensate, together with exciter control pedestal, automatic voltage regulator and pipework. (T. 18749/1939.)*

Inverness.—March 11th. Town Council. Electric lighting installations at ninety houses (Muirton Nursery site). Town Clerk.

Keighley.—March 9th. Electricity Department. Cables, motors and starters, metal-clad switchgear, transformers and meters for twelve months. (See this issue.)

Kirkcaldy.—March 11th. Town Council. Electric lighting and power, boiler house plant, central heating, &c., at the new municipal buildings. Town Clerk (deposit £2).

March 20th. Electricity Department. Aluminium cooking utensils, cooker control units, AC meters and domestic electric cookers for twelve months. (See this issue.)

Kirriemuir.—March 13th. Town Council. Electric lighting of thirty-six houses at Knowehead and Middlefield housing estate. (Town Clerk (deposit £1 1s.).

Leyton.—March 13th. Electricity Department. Cables for twelve months. (See this issue.)

Littleborough.—March 4th. Electricity Department. P.i., low-voltage cables and AC house service meters for twelve months. (February 17th.)

London.—H.M. OFFICE OF WORKS.—February 28th. High- and low-voltage cables and accessories at Pembrey R.O.F. (February 10th.)

March 17th. Dust-tight, waterproof and flameproof switchgear for Brigend and Glascoed R.O.F. (See this issue.)

March 10th. Electrical wiring at Bridgend R.O.F. (See this issue.)

March 17th. Switchgear and transformers at Pembrey and Bishopton R.O.F. (See this issue.)

March 9th. Electric hand lamps (dry battery type. (See this issue.)

POPLAR.—March 3rd. Borough Council. Materials for twelve months. (February 10th.)

STEPNEY.—March 6th. Electricity supply undertaking. Extra-high and low-voltage, p.i. cables for twelve months. (February 17th.)

ST. MARYLEBONE.—March 22nd. Borough Council. Portable generating and pumping sets and fire fighting equipment. (February 17th.)

Manchester. — March 6th. Electricity Committee. Emergency control panels for 6.6-kV switchgear at Stuart Street power station; mercury-arc rectifiers. (See this issue.)

New Zealand. — WELLINGTON.—Public Works Department. March 28th. Power and control cables and accessories, service and terminal boxes and cable fittings at R.N.Z.A.F. Station, Ohakea. (T. 18463/39.)*

March 28th. Distribution switchboard and power and control cables and accessories at the R.N.Z.A.F. Station, Whanuapai. (T. 18460 and T. 18461/39.)*

May 2nd. 50-kW outdoor switchgear and steelwork. (T.Y. 18465/39.)*

May 23rd. Two bays of galvanised steelwork and switchgear at Waikaremoana lower power station. (T. 18598/39.)*

May 23rd. One 100-ton electric travelling crane. (T. 18454/39.)*

Newcastle-on-Tyne.—City Council. Installation of electric lighting in 150 houses on the Longbenton estate. Plans by R. G. Roberts, city architect, 18, Cloth Market.

Oban.—March 6th. Burgh Council. Two 500-kW heavy-oil engine and alternator sets, cooling tower and auxiliaries. (February 17th.)

Oldham.—March 6th. Borough Council. Electric lighting installation at the Strinesdale housing estate (166 houses). T. Alker, Town Clerk, Town Hall (deposit £1 1s.).

Poole.—March 4th. Joint Sanatorium Board. Electrical installation in connection with the extensions at Poole Joint Sanatorium, Nunthorpe, near Middlesbrough. Clerk to the Board, Town Hall, Sunderland (deposit £10).

Portland.—March 11th. Electricity Department. Stores and materials for twelve months. (February 17th.)

Rhondda.—March 25th. Electricity Department. Stores and materials for twelve months. (February 10th.)

Scunthorpe.—March 21st. Electricity Department. Materials for twelve months. (See this issue.)

South Africa.—CAPE TOWN.—March 1st. Electricity Department. Cables and jointing material. (T.Y. 18714/39.)*

March 2nd. Insulated copper wire. (T.Y. 18715/39.)*

February 8th. Electric lamps. (T. 18712/1939.)*

JOHANNESBURG.—March 13th. Railways and Harbours Administration. Electrical signal material. (T. 18693/39.)*

PRETORIA.—March 30th. Posts and Telegraph Department. Eleven magneto motor-driven generators. (T.Y. 18859/39.)*

Southport.—March 9th. Borough Council. Extra-high-voltage sub-station switchgear and static transformers. (See this issue.)

Stoke-on-Trent.—March 8th. Electrical Engineer's Department. Extra-high-voltage sub-station switchgear and static transformers for twelve months. (February 17th.)

Uruguay. — MONTEVIDEO. — February 28th. Electricity Supply and Telephones Administration. 850 combination circuit-breakers. (T. 18051/39.)*

Wakefield.—February 27th. County Council of the West Riding of Yorkshire. Installation of electric lighting in the Skelmanthorpe new senior school and caretaker's house. Clerk of the County Council, County Hall.

March 6th. Electric lighting installation at new gymnasium at the Normanton girls high school, and at extensions to the Silsden Hothfield Street school. Clerk of the County Council, County Hall.

Wallasey.—March 14th. Electricity Department. High-voltage cables, transformers, switch pillars and street lighting poles, fittings and mercury vapour lamps. (February 17th.)

Worcester.—February 28th. Electricity Department. Cables, conductors, trans-

formers and meters for twelve months. (February 10th.)

Workington.—March 10th. Electricity Department. Stores and materials for twelve months. (See this issue.)

Orders Placed

Bradford.—Education Committee. Recommended. Electrical work at Technical College extensions (£1,126).—J. Carter.

Brighton. — Corporation. Accepted. Low-voltage switchboard at Southwick power station.—English Electric Co.

Accepted. Control-panel for turbo-generator set (£956).—Brush Electrical Engineering Co.

Dartford.—Electricity Committee. Recommended. Rectifying plant (£1,378).—Hewittic Electric Co.

Darlington.—Town Council. Accepted. Auxiliary motor starting equipment in connection with the power station extensions.—Met.-Vick. Electrical Co.

Dublin.—Accepted. Renewal of the electrical installation at Collins Barracks, Dublin.—Haden's Engineering Co.

Glasgow.—Public Health Committee. Accepted. Heating installation at Nurses' Home, Gartloch Mental Hospital (£1,298).—G. N. Haden & Sons.

Transport Committee. Accepted. Electrical equipment at Whitevale substation (£28,450).—Met.-Vick. Electrical Co. Copper bonds.—B.I. Cables.

Hull.—Education Committee. Accepted. Electrical installation at McMillan school (£234).—Booker & Tarran.

Telephone Committee. Accepted. Cable (£296).—Union Cable Co. Copper wire (£407).—B.I. Cables.

London.—Metropolitan Water Board. Accepted. Electrical fittings for Cricklewood pumping station (£239).—M. & C. Switchgear. Recommended. Booster pump for Willesden station (£1,010).—Gwynnes Pumps.

Portsmouth.—Beach Committee. Accepted. Clock for Castle Café gardens (£112).—Smiths Electric Clocks.

Contracts Committee. Accepted. Cables for six months.—Aberdare Cables; Hackbridge Cable Co.; William Geipel; General Cable Manufacturing Co.; G.E.C.; Scottish Cables.

Stourbridge.—Town Council. Accepted. Electrical work at Public Baths (£528).—Gwilliam Bros.

Stranraer.—Town Council. Accepted. Electric fittings at 100 houses on the Moore Field site (£438).—A. Arkley.

Wallsend. — North-Eastern Housing Association. Accepted. Electrical installations for 142 houses at Low Willington (£662).—E. Culham.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen. — Branch library, School Road (£10,000); city architect.

Bangor.—Three-storey building, High Street, for F. W. Woolworth & Co., Ltd.; B. C. Donaldson, resident architect, F. W. Woolworth & Co., Ltd., New Bond Street, London, W.1.

Barking.—Town hall and municipal offices, for T.C.; Jackson & Edmunds, architects, 24, Bennetts Hill, Birmingham.

Barnstaple.—Houses (34); Woolaway & Sons, builders.

Bath.—Market and abattoir (£43,000); borough surveyor.

Blackhall (Co. DURHAM).—Cinema, Elm Avenue; W. L. Grant, builder, Loaning Burn, Eastington.

Blackpool. — Cinema, Collingwood Avenue; A. Hall. Hotel (£75,000), Starr Gate and South Promenade; W. L. Marshall.

Bowburn (Co. DURHAM). — Cinema; P. L. Browne, Son and Harding, architects, Pearl Buildings, Northumberland Street, Newcastle-on-Tyne.

Cardiff. — Large magnesium works, Roath, for International Alloys, Ltd.; Col. W. C. Devereux, chairman.

Chester.—Cinema, Christleton Road; A. H. Moorcroft, Christleton.

Crewe.—School, Underwood Lane, for E.C.; L. Reeves, borough architect, Municipal Buildings, Earle Street.

Darlington. — Hotel (£50,000), Blackwell, for Edlington Hotels, Ltd.; E. M. Lawson, architect, Barras Bridge, Newcastle-on-Tyne.

Derby. — Hangar, Airport (£19,288); borough engineer.

Doncaster. — Airport hotel (£100,000), for G. Hewitt; Wilburn & Atkinson, architects, 11, South Parade.

Dorchester.—Houses (24), Victoria Park estate; Dunmow Building and Public Works Contractors, Ltd.

Dryburn (NEAR DURHAM CITY).—Hospital, for Durham County Council; W. J. Merritt, county engineer, Shire Hall, Durham.

Dundee.—Buildings and improvements to King's Cross Hospital (£100,000); city architect.

Durham.—Hotel, Sniperly Park estate, for J. Calder and Co.; G. E. Charlewood, architect, 4, Mosley Street, Newcastle-on-Tyne.

Easington.—Houses (76), South Hetton, and 66, Wingate, for the R.D.C.; C. W. Clarke, surveyor.

Edinburgh. — School, Pilton Avenue, Granton, for the Corporation E.C. (£100,000); J. S. Johnston, architect, 47, Charlotte Street, Leith.

Edmonton. — Fire station, Church Street; E. J. Willis, borough surveyor.

Fleetwood.—Chalets, restaurant, bathing pool, Western Promenade, for Fleetwood Cinema & Bath Holdings Co., Ltd., 49, Princess Street, Manchester; R. H. Cunliffe, architect, Estate Office, Victoria Road, Cleveleys, Blackpool.

Gateshead. — Factory, Kingsway, for North-Eastern Trading Estates, Ltd.; Liddle and Batchelor, architects, Milburn House, Newcastle-on-Tyne. Two factories, Third Avenue, for North-Eastern Trading Estates, Ltd.; J. W. Hanson and Son, architects, 18, Eldon Square, Newcastle-on-Tyne.

Gillingham. — Library, Rainham; borough engineer.

Glasgow.—Blackhill school (£23,000); education director. Extensions to Mitchell library (£44,000); city engineer.

Greenock. — Municipal hospital (£187,000); burgh surveyor.

Heighington (NEAR DARLINGTON).—Laundry, kitchen, general stores at Durham County Council Mental Deficiency Colony; T. Rees and R. Holt, architects, Rodney Street, Liverpool.

Hexham-on-Tyne.—Houses (12), North Wylam, and 8 at Gunnerton, for the Hexham R.D.C.; W. Dixon & Son, architects, 1, Collingwood Street, Newcastle-on-Tyne.

Heywood.—Houses (254), Back Moss estate; borough engineer.

Hull.—Three-storey block of offices, George Street, for Halifax Building Society; Markwell, Holmes & Hayter, Ltd., builders, Albert Avenue.

Kent.—First section of Regional College of Science and Commerce, Bromley, for the E.C. Hospitals, Farnborough, Medway and Dartford, and extensions to County hospital, Sheppey (£18,000); county architect.

Keyworth. — Cinema; R. W. Cooper, architect, Talbot Street, Nottingham.

Leicester.—Rebuilding of factory premises, 15, Wellington Street; Barton & Everitt, architects, King's Chambers, 1, Bowling Green Street.

Lincoln. — Extensions to Lincoln City Hospital and Dawber Sanatorium (£52,250); city surveyor.

Liverpool.—Houses (16), Woburn Hill, for Sherwood Property Co., Ltd.; T. Bibbey, architect, 14, Chapel Street, Liverpool. Office block, Dale Street and Hale Street, for the Eagle Star Insurance Co., Ltd., Exchange Buildings, Exchange Street East; A. E. Shennan, architect, North House, 17, North John Street. Printing works, Fazackerley; Quiggin & Gee, architects, North House, 17, North John Street, Liverpool. Ten shops and houses, Hunt's Cross Avenue; Pierce Williams & Son, 141, Upper Warwick Street. Works, Edwards Lane, Speke, for Hayes Engineering Co., Ltd.; W. A. Lowry, architect, 41, Arcade Buildings.

London.—(HACKNEY).—Extensions to factory, for Edward C. Barlow & Sons, Ltd., Urswick Road. (POPLAR).—Redevelopment of Woolmore Street area (£86,600); L.C.C. architect, County Hall, Westminster Bridge Road, S.E.1. (ST. PANCRAS).—Rehousing, Maitland Park; L.C.C. architect. (SHOREDITCH).—Large factory, East Road, for Dottridge Bros., Ltd.; A. & V. Burr, architects, 85, Gower Street, London, W.C.1. (W.C.2).—Reconstruction of Hippodrome Theatre, Charing Cross Road (£300,000), for Moss Empires, Ltd.; R. Cromie, architect, 6, Cavendish Square, W.1.

Lossiemouth (MORAYSHIRE).—Cinema, Caledonian Associated Cinemas, Ltd., Major Cattanach, architect, Kingussie.

Luton.—Extensions to factory, for Percival Aircraft, Ltd.

Manchester.—Sports stadium and arena (£150,000), Tipping Street, near Mayfield Station, London Road; C. Swain, Ridgefield, Deansgate. Additions to the buildings of the Royal Eye Hospital, Chorlton-on-Medlock; Worthington & Sons, architects, Oxford Road, Manchester.

Middlesbrough. — R.C. senior school, Grove Hill (£35,000); T. Crawford, architect, 82, Borough Road, Middlesbrough.

Middleton.—Houses (46), Green Street; Derbyshire Building Society, Ltd., Irongate, Derby.

Morecambe.—Concert hall, café, and floral hall (£100,000); Empire Theatre (Morecambe), Ltd.

Morpeth.—Offices (£9,500); R.D.C. surveyor.

Newburn-on-Tyne.—Hospital (£16,000); P. L. Browne, Son and Harding, architects, Pearl Buildings, Newcastle-on-Tyne.

Newcastle-upon-Tyne. — School, Waterworks Road, Delaval; education architect, Northumberland Road. Extensions, Wallace Street, for Northern Coachbuilders, Ltd.; J. R. Rutherford and Sons, builders, Minories Joinery Works.

Newquay (CORNWALL).—Cinema; Morter and Dobie, architects, The Temple, 24, Dale Street, Liverpool.

North Shields.—Hotel, Chirton, for J. Rowell and Son; Oswald and Son, architects, Bradburns Chambers, Northumberland Street, Newcastle-on-Tyne.

Ormskirk.—Cinema, Northway, Maghull; Alt Park Estates, Ltd.

Pelton (Co. DURHAM).—School; Hadden and Hillman, contractors, Huddleston Street, Newcastle-on-Tyne.

Portsmouth.—Extensions to works for J. Evans & Sons (Portsmouth), Ltd., Goldsmith Avenue.

Prestatyn. — Hotel, Victoria Road (£16,000); W. B. Kitchen.

Queensbury.—Houses (20), Cheapside Shelf; U.D.C. surveyor, Council Offices, Queensbury.

Redditch.—Shopping centre, Birmingham Road; Holding & Sons, builders, Cobb Lane, Bourneville, Birmingham.

Sheffield.—Houses (26), Mill Dale Road, for D. Marcroft, 1, Marstone Crescent, Totley Rise; B. D. Thompson, architect, 83, Bridge Street, Worksop.

Southampton. — Community centre, Coxford (£22,600); borough surveyor.

Stirlingshire.—School, Stirling, for the C.C.; architect, County Offices, Stirling.

Stratford-on-Avon. — Cinema, facing High Street, for Picture House, Ltd.; R. Satchwell, architect, 6, New Street, Birmingham.

Stretford.—Fire station, Park Road, for the T.C.; C. Jefferies, contractors, 3, Entwisle Avenue, Davyhulme, Urmston, Manchester.

Thornaby-on-Tees.—Houses (60), for T.C.; P. Brown, borough engineer.

Wallsend-on-Tyne.—Houses and flats (753), Station Road; W. Leech, 2, Clayton Street, Newcastle-on-Tyne. Hotel, for A. Arrol and Sons, Newcastle-on-Tyne; S. H. Lawson, architect, Emmerson Chambers, Newcastle-on-Tyne.

Warrington.—Houses (36), Derwent Road; M. W. Beswick, Ltd., 45, Sunderland Road, Broadheath.

West Hartlepool.—Houses (13), Duke Street, Topcliffe Street and Harcourt Street; W. W. Brazell, builder, Raeburn Street. Enlargement of the Municipal Buildings; F. Durkin, borough engineer and architect.

Whitby.—Houses, Abbeylands Farm and Cholmey Fields; U.D.C. surveyor.

Wood Green.—Extensions to television studio, Alexandra Palace, for B.B.C.; M. T. Tudsbery, architect, Broadcasting House, Portland Place, London, W.1.